COMPAQ

ProLiant Clusters for SCO UnixWare 7 U/300

Quick Install Guide for the Compaq ProLiant ML370

First Edition (January 2001)
Part Number 221540-001
Compaq Computer Corporation

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About This Guide

Use the *Compaq ProLiant Clusters for the SCO UnixWare 7 U/300 Quick Install Guide for the Compaq ProLiant ML370* as step-by-step instructions for installation and as a reference for cluster operation and troubleshooting.

Text Conventions

The following conventions distinguish elements of text:

Keys, **Buttons**	Keys and buttons appear in boldface. A plus sign (+) between two keys indicates that they should be pressed simultaneously.
User Input, File Names, Directory Names, Commands, Examples, Screen Elements	These elements appear in a different typeface.
Variables	Information supplied by the user appears in italics.
Menu Options, Dialog Box Names	These elements appear in initial capital letters.
Type	When you are instructed to type information, type the information without pressing the **Enter** key.
Enter	When you are instructed to enter information, type the information and then press the **Enter** key.

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Symbols in Text

These symbols may be found in the text of this guide. They have the following meanings.

WARNING: Text set off in this manner indicates that failure to follow directions in the warning can result in bodily harm or loss of life.

CAUTION: Text set off in this manner indicates that failure to follow directions could result in damage to equipment or loss of information.

IMPORTANT: Text set off in this manner presents clarifying information or specific instructions.

NOTE: Text set off in this manner presents commentary, sidelights, or interesting points of information.

Symbols on Equipment

These symbols may be located on equipment in areas where hazardous conditions may exist.

This symbol, in conjunction with any of the following symbols, indicates the presence of a potential hazard. The potential for injury exists if warnings are not observed. Consult your documentation for specific details.

This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.

WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

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This symbol, on an RJ-45 receptacle, indicates a network interface connection.

WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.

WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.

These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.

WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.

Weight in kg
Weight in lb

WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

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Getting Help

If you have a problem and have exhausted the information in this guide, you can obtain further information and other help in the following locations.

Compaq Technical Support

In North America, call the Compaq Technical Support Phone Center at 1-800-OK-COMPAQ. This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call the nearest Compaq Technical Support Phone Center. Telephone numbers for worldwide Technical Support Centers are listed on the Compaq website. Access the Compaq website by logging on to the Internet at

http://www.compaq.com

Be sure to have the following information available before you call Compaq:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

Compaq Support Website

The Compaq Support website has information on this product and the latest drivers and Flash ROM images. You can access the Compaq Support website by logging on to the Internet at

http://www.compaq.com/support

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Compaq Authorized Reseller

For the name of your nearest Compaq authorized reseller:

- In the United States, call 1-800-345-1518.
- In Canada, call 1-800-263-5868.
- Elsewhere, see the Compaq website for locations and telephone numbers.

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Chapter 1

Clustering Overview

A Compaq *ProLiant*™ Cluster for UnixWare 7 is a collection of servers, storage, and software that allows independent storage and servers to act as a single system. The cluster presents a single-system image to clients. It also protects against hardware, operating system, middleware, and application failures and provides configuration options for load balancing.

Clustering is an established technology that can provide the following benefits:

- Availability
- Scalability
- Manageability
- Investment protection
- Operational efficiency

The reliability of the SCO UnixWare 7 *NonStop*™ Clusters technology ensures that your applications and data are protected from multiple error conditions. For more details on Compaq ProLiant Clusters for SCO UnixWare 7, see the Compaq High Availability website at

http://www.compaq.com/highavailability

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Compaq ProLiant Clusters for SCO UnixWare 7 U/300

The Compaq ProLiant Clusters for SCO UnixWare 7 U/300 Quick Install Cluster Kit (U/300 kit) for the ProLiant ML370 server supports specific hardware components, enabling the cluster software to be installed in about an hour. Cluster components include servers, internal disk drives, external storage, cluster interconnect, software, and local area network (LAN) hardware. Cluster software provides installation capabilities, the operating system, and various Compaq cluster management utilities. To set up the cluster, you must assemble the cluster components, initialize them, and install the cluster software.

Hardware Components

Supported cluster hardware components for this Quick Install include ProLiant ML370 servers, the Compaq StorageWorks RAID Array 4100 (RA4100) storage subsystem, the hardware required for the cluster interconnect, public network interface controller (NIC), and the Cluster Integrity (CI) serial cable.

Server Components

The U/300 kit for the ProLiant ML370 server supports the following server hardware components:

- Two identical ProLiant ML370 servers with an embedded NIC in each server
- One 9.1-GB or larger disk drive in each server
- One 64-bit Fibre Channel Host Bus Adapter (HBA) in slot 3 of each server
- Two Gigabit Interface Converters Shortwave (GBIC-SW), one installed into each HBA in slot 3 of each server
- One CI serial cable (provided in the cluster kit)
- For clusters using Ethernet interconnect:
  - One Compaq NC3123 Fast Ethernet NIC (NC3123 NIC) PCI 10/100 Wake on LAN (WOL) installed into slot I of each server for public network access
  - One crossover cable for the cluster interconnect (provided in the cluster kit)

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- For clusters using *ServerNet*™ I interconnect:
  - One ServerNet I PCI adapter installed into slot 1 of each server
  - Two ServerNet I cables

Storage Components

The U/300 kit for the ProLiant ML370 server supports the following storage hardware components:

- One RA4100 storage subsystem, including one Compaq StorageWorks RAID Array 4000 (RA4000) primary array controller
- One RA4000 redundant array controller
- Two GBIC-SWs, one in each controller
- Two 9.1-GB or larger disk drives, one in each slot 0
- Two multimode Fibre Cbannel cables

Cluster Interconnect

ProLiant Clusters for SCO UnixWare 7 with the ProLiant ML370 server can use either a high-speed ServerNet I network or a dedicated, private Ethernet network to connect the cluster nodes. The cluster nodes use the interconnect data path to support the following cluster features:

- Cluster-wide file system
- Cluster-wide process management, migration, and load balancing
- Cluster-wide networking and Cluster Virtual IP (CVIP)
- Cluster-wide system administration and management

The ServerNet I cluster interconnect uses two ServerNet I PCI adapters and two ServerNet I cables to connect the nodes. The Ethernet cluster interconnect uses the embedded NICs and an Ethernet crossover cable to connect the two nodes.

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Cluster Integrity Serial Cable

The Cluster Integrity (CI) serial cable listed with the server components is required for the U/300 Quick Install cluster for the ProLiant ML370 server.

This cable prevents the condition in which more than one node in a cluster acts as the root node and operates as the root node. Because the active root node mounts the root file system and runs several critical cluster-wide functions, more than one node trying to behave as the root node is undesirable.

NOTE: The CI serial cable may be referred to as the split-brain avoidance (SBA) serial cable in UnixWare software and documentation.

Hardware Configuration

The U/300 kit for the ProLiant ML370 server supports the server and storage hardware in specific configurations based on the type of cluster interconnect. The CI serial cable is required for all configurations.

A ServerNet I cluster interconnect uses the two ServerNet I PCI adapters and two cables as shown in Figure 1-1.

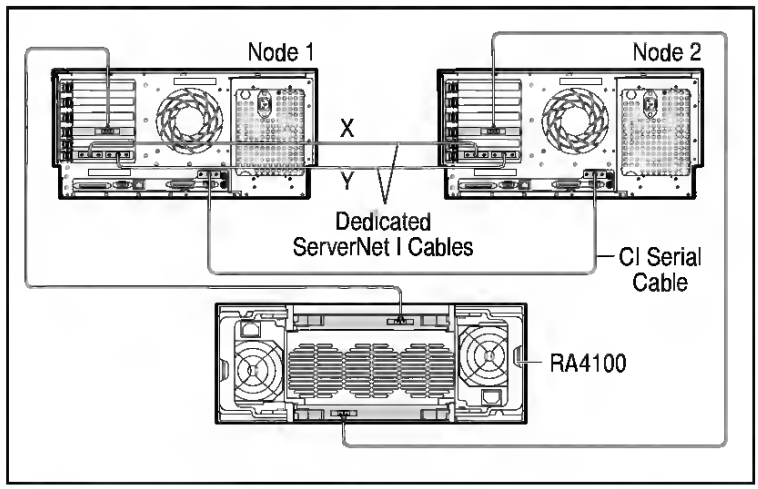

Figure 1-1. Example of hardware components of the ServerNet I cluster interconnect configuration

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An Ethernet cluster interconnect uses the embedded NIC in each server connected by one Ethernet crossover cable as shown in Figure 1-2.

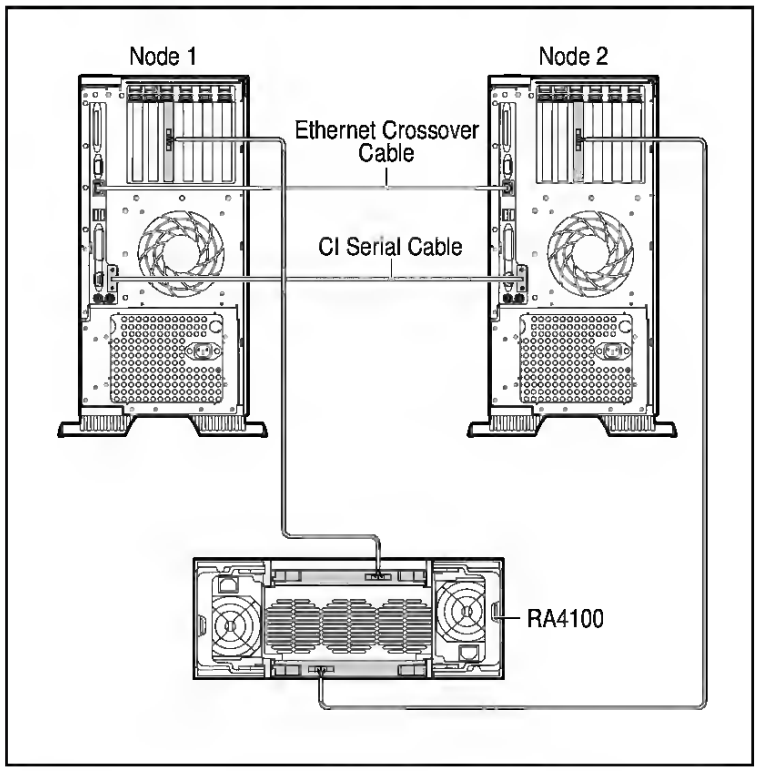

Figure 1-2. Example of hardware components of the Ethernet cluster interconnect configuration

LAN Connection

Clusters using Ethernet interconnect require an NC3123 NIC installed into slot 1 of each node before cluster software installation so that the cluster can access a public network. These NICs must be on a different subnet from the embedded Ethernet cluster interconnect. Multiple public network controllers can be installed after cluster installation is complete. For a list of certified NICs, see the Compaq High Availability website at

http://www.compaq.com/highavailability

Clusters that use ServerNet I interconnect access the public network using the embedded NIC. Eacb server must be connected to the same network.

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Software Components

Software components of the U/300 kit for the ProLiant ML370 server include:

- SCO UnixWare Release 7.1.1 Compact Media Kit
- SCO UnixWare 7 NonStop Clusters Media Kit Version 7.1.1+IP
- Compaq ProLiant Clusters for SCO UnixWare 7 ML370 Quick Install CDs for the Compaq ProLiant ML370 server

Cluster-related software provided with the ProLiant ML370 server includes:

- Compaq *SmartStart*™ and Support Software CD
- Compaq Management CD

Additionally, you must obtain software licenses.

NOTE: SCO UnixWare 7 (with Mirroring Option or Online Data Manager) and UnixWare 7 NonStop Clusters software licenses must be purchased through your SCO reseller or distributor. To locate a convenient SCO reseller or distributor to purchase licenses, see the SCO website at

http://www.sco.com

SCO UnixWare Software

SCO UnixWare 7 and the SCO UnixWare 7 NonStop Clusters software provide the operating environment for the ProLiant Clusters for SCO UnixWare 7. The SCO UnixWare 7 NonStop Clusters software provides the technology to:

- Perform single-system image operations
- Perform failover
- Define and modify cluster members
- Manually control and administer the cluster
- View the current state of the cluster

This software is included in the U/300 kit.

NOTE: The U/300 kit includes SCO UnixWare 7.1.1 and SCO UnixWare NonStop Clusters 7.1.1+IP. Other versions of the operating system and cluster software are not supported by this kit.

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NOTE: SCO UnixWare 7 (with Mirroring Option or Online Data Manager) and UnixWare 7 NonStop Clusters software licenses must be purchased through your SCO reseller or distributor. To locate a convenient SCO reseller or distributor to purchase licenses, see the SCO website at

http://www.sco.com

Quick Install CDs for the ProLiant ML370 Server

The Quick Install CDs for the ProLiant ML370 server provide rapid and simplified cluster installation. These CDs contain all the necessary software already configured for immediate cluster boot. An installation wizard allows you to enter parameters and licenses specific to your configuration.

The Quick Install CDs for the ProLiant ML370 server contain a readme.html file, which includes descriptions of potential problems and how to avoid or correct them.

The Quick Install CDs for the ProLiant ML370 server also include the following utilities:

- NonStop Clusters Verification Utility (NSCVU)

  The NSCVU validates Compaq ProLiant Clusters for SCO UnixWare 7 and their components. The NSCVU is run from any node in the cluster and tests cluster configuration in the following categories:

  - ServerNet I connectivity tests verify that the nodes in the cluster can communicate over X and Y ServerNet I paths.
  - Ethernet connectivity tests verify that the nodes can communicate over the Ethernet cluster interconnect.
  - Storage tests verify the presence of, and minimum configuration requirements of, supported HBAs, array controllers, and external storage subsystems.
  - System software tests verify that SCO UnixWare 7 and SCO UnixWare 7 NonStop Clusters software have been properly installed.

  For further information on running the NSCVU, refer to the nscvu(1M) manual page, which can be viewed with the man(1M) command or in the SCOhelp online documentation set.

- Uninterruptible Power Supply (UPS) software

  This software provides management capabilities for UPSs connected to the cluster.

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- *Compaq Insight Manager*™ Agents

  These agents provide system information to the Compaq Insight Manager, which is available on the Management CD that comes with the ProLiant servers.

Compaq ServerNet Verification Utility (SVU)

The Compaq ServerNet Verification Utility (SVU) verifies proper installation and cabling of the Compaq ServerNet I interconnect before a UnixWare software installation. The SVU is a utility run from bootable diskettes inserted into each cluster node. For more information on creating the diskettes and running the SVU, refer to Chapter 3, "Installing Cluster Software," of this guide.

Compaq SmartStart and Support Software CD

SmartStart is located on the SmartStart and Support Software CD shipped with ProLiant servers. This CD is required for ServerNet I configurations. You can also use the CD to configure additional hardware. For information concerning SmartStart, refer to the Compaq Server Setup and Management package that comes with your server. The following utilities on the SmartStart CD are used for your cluster:

- Compaq Array Configuration Utility (ACU)

  The Compaq ACU is an offline tool that is used to configure the array controller, add disk drives to an existing configuration, and expand capacity.

- Options *ROMPaq*™ Utility

  The SmartStart and Support Software CD contains the Options ROMPaq Utility. Options ROMPaq updates the firmware on the disk drives and controller.

- Fibre Channel Fault Isolation Utility (FFIU)

  The FFIU verifies the integrity of the Fibre Channel Arbitrated Loop (FC-AL) installation. This utility provides fault detection and belp in locating a failing device on the FC-AL.

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Compaq Management CD

The Compaq Management CD shipped with ProLiant servers contains software for managing Compaq clusters. The Compaq Insight Manager is included on the CD along with Compaq Management Agents and Tools for Servers for SCO UnixWare 7 NonStop Cluster. The Quick Install process automatically installs the agents and tools.

- Compaq Insight Manager

  Compaq Insight Manager is an easy-to-use Microsoft Win32 software utility for collecting server and cluster information. Compaq Insight Manager performs the following functions:

  - Monitors fault conditions and system status
  - Monitors shared storage and interconnect adapters
  - Forwards server alert fault conditions
  - Remotely controls servers

  In Compaq servers, each hardware subsystem, such as disk drive storage, system memory, and system processor, has a robust set of management capabilities. Compaq Insight Manager notifies the system administrator of impending fault conditions.

  For information concerning Compaq Insight Manager, refer to the Compaq Server Setup and Management package. See Chapter 4, "Managing Clusters," for more information.

- Compaq Management Agents and Tools for Servers for SCO UnixWare 7 NonStop Clusters.

  SCO UnixWare 7 NonStop Clusters and SCO UnixWare 7 agents and tools include the Compaq Insight Manager agents, the NSCVU software, and the UPS management software described in "Quick Install CDs for the ProLiant ML370 Server" earlier in this chapter and in detail in Chapter 4.

Software Licenses

Licenses for UnixWare 7 (with Mirroring option or Online Data Manager) and UnixWare 7 NonStop Clusters are not provided in the cluster kit. The licenses must be purchased from an authorized SCO reseller. To locate a SCO reseller, visit the following URL:

http://www.sco.com

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Overview of Cluster Assembly and Software Installation Steps

Use the following general steps to set up your cluster hardware, initialize the hardware, and install the software. The specific procedures are found in the sections noted in these steps:

1. Set up the cluster hardware.

   Cluster hardware assembly includes the following tasks:

   - Setting up the rack that contains the server and storage components if your cluster uses a rack. Refer to the section "Assembling the Rack" in Chapter 2, "Setting Up Cluster Hardware."
   - Setting up the cluster nodes so that they include the hardware required for cluster operation, including internal disk drives, adapters, and NICs. To set up the cluster nodes, refer to "Setting up the Cluster Nodes" in Chapter 2.
   - Setting up external storage hardware components according to the documentation that came with them. Once you have set up the hardware, you must cable the hardware. To set up the external storage, refer to "Setting up the External Storage Hardware" in Chapter 2.

2. Perform preinstallation tasks.

   Before beginning any software installation procedures, you must perform a few tasks to prepare for the installation. You must obtain SCO UnixWare 7 and SCO UnixWare 7 NonStop Clusters licenses, read through all the installation procedures to become familiar with them, fill out the installation worksheets in Appendix B of this guide, and ensure that the servers each contain a single disk drive. Refer to the section "Understanding Preinstallation Tasks and Considerations" in Chapter 3, "Installing Cluster Hardware."

3. Configure the servers.

   Configuring the servers involves erasing any existing configuration and using the SmartStart CD to set up the servers to use the SCO UnixWare 7 operating system. Refer to "Configuring the Servers" in Chapter 3.

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4. Upgrade controller firmware.

   Firmware provides an interface between hardware and software. It is important to use the latest firmware for full hardware functionality. Upgrading controller firmware is performed using a diskette created as part of server configuration. Refer to "Updating Controller Firmware" in Chapter 3.

5. Verify ServerNet I connections.

   If your cluster uses the ServerNet I cluster interconnect, you must ensure that the hardware for the interconnect is properly installed. This procedure instructs you to perform tests of the adapters and the cables. Refer to "Verifying ServerNet I Connections" in Chapter 3.

6. Install the software.

   Installing the software provides your cluster with the SCO UnixWare 7 operating system and the SCO UnixWare 7 NonStop Clusters software discussed in this chapter. You must select the Quick Install CDs for your configuration and install the software on both nodes. Installation prompts guide you through the installation and request the information found in your completed worksheets. Refer to "Installing the Cluster Using Quick Install" in Chapter 3.

The following sections offer sources of information and support for application installation and cluster documentation.

Resources for Application Installation

Client/server software applications are among the key components of any cluster. Compaq is working with its key software partners to ensure that cluster-aware applications are available and that the applications work seamlessly on Compaq ProLiant Clusters for SCO UnixWare 7.

Compaq white papers provide information about installing applications in Compaq ProLiant Clusters for SCO UnixWare 7. Visit the Compaq High Availability website to download cluster-related white papers and other technical documents at

http://www.compaq.com/highavailability

IMPORTANT: Some software applications may need to be updated to take advantage of clustering. Contact the software vendors to check whether their software supports SCO UnixWare 7 NonStop Clusters and to ask whether any patches or updates are available for SCO UnixWare 7 NonStop Clusters operation.

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Other References

For more information about the RA4100 storage subsystem or RA4000 redundant array controller, refer to the following guides, either as included with your hardware or as found at the Compaq Support website at

http://www.compaq.com/support/

- *Compaq StorageWorks RAID Array 4100 User Guide*
- Compaq StorageWorks RAID Array 4100 Configuration poster
- Compaq StorageWorks RAID Array 4000 Redundant Array Controller Configuration poster
- *Compaq Fibre Channel Storage System User Guide*
- *Compaq StorageWorks Fibre Channel Host Adapter Installation Guide*
- *Compaq Fibre Channel Troubleshooting Guide*
- *Compaq Fibre Channel Storage System Technology*

For more information about cluster use and administration, refer to the *SCO UnixWare 7 NonStop Clusters System Administrator's Guide*, located in the SCOhelp online documentation set in the NonStop Clusters Documentation topic.

SCO UnixWare 7 NonStop Clusters Documentation

The SCO UnixWare 7 NonStop Clusters software includes online documentation, which you can view after the cluster is installed. The main documentation set is called SCOhelp and contains information that can answer many administrative questions. SCOhelp is available when you use the UnixWare Desktop and remotely using a Web browser when your cluster is connected to the public network. Additionally, you can access manual pages using the man(1M) command.

Access the online documentation in the following ways:

- Click the book-and-question-mark icon in the toolbar on the UnixWare Desktop to access SCOhelp. A browser displays the main SCOhelp list of topics.
- Type scohelp at the command line of a desktop terminal (dtterm) to access SCOhelp. A browser displays the main SCOhelp list of topics.

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- Use the following URL to access SCOhelp remotely when the cluster is attached to the public network:

  http:// *clustername*:457

  Substitute the name of your cluster or its CVIP address for *clustername*. The browser displays the main SCOhelp list of topics.

- Use the man command to access manual pages from any command line by entering man and the name of the command, file, or routine about which you want information. For example, enter:

  ```
  man cluster
  ```

  The man command displays the reference page for the cluster command.

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Chapter 2

Setting Up Cluster Hardware

Setting up a cluster includes setting up, cabling, and verifying hardware components. Use the following sections to set up the Compaq ProLiant Clusters for SCO UnixWare 7 U/300 for the Compaq ProLiant ML370 Quick Install Cluster:

- Assembling the Rack
- Setting Up the Cluster Nodes
- Setting Up the External Storage Hardware
- Cabling the Components

For specific information about individual components, see the documentation that comes with the component. For information on steps and procedures for setting up cluster hardware, refer to the documentation that comes with the hardware.

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Assembling the Rack

In clusters that use racks, rack assembly requires careful attention to avoid problems.

Evaluate the site where the cluster is to be installed by checking the path and setup area.

- Check the path from the receiving dock to the installation area for the following conditions:
  - Height and width of doors
  - Ceiling height and overhead obstacles
  - Change in slope of the floor or change in other elevation
  - Floor roughness, texture, gaps, and obstacles
  - Floor load capacity
- Check the area where the hardware is to be unpacked for the following conditions:
  - Adequate proximity to installation area
  - Maneuvering room
  - Room to disassemble the crate
  - Room for the ramp and for rolling the hardware off the crate
- Check the installation area for the following conditions:
  - Adequate power needs, including outlets, breakers, electrical quality, and grounding
  - Cooling capacity
  - Cable handling capacity
  - Floor load capacity
  - Clearance for the equipment

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Stacking Components

Keep in mind the following considerations while stacking components in a rack:

- Put the UPSs in the bottom of the rack.
- Assemble other components into the rack from the bottom up.
- Put the heaviest equipment per U of height in the bottom of the rack whenever possible.
- Install non-flat-panel monitors toward the top of the rack.
- Install components that require better cooling capacity toward the top of the rack.
- Purchase the rack stabilizer feet option when offered.

The typical stacking order has the UPSs at the bottom and progresses upward according to the following list:

- UPS
- Storage subsystems
- Node 1 and node 2
- Keyboard/mouse/monitor switch
- Monitor and expansion nodes

CAUTION: Load the racks from the bottom up to avoid tipping the rack.

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Transporting Racks

Before transporting a filled rack, read the documentation that comes with the rack to determine the safety measures to take for successful transportation. Never transport a rack without first reviewing the documentation.

Develop standard procedures for securing rack equipment depending on the rack and its components. Standard procedures include:

- Verify that the rack is secured to the pallet.
- Remove all loose items from the rack and the pallet.
- Disconnect the cabling, ensuring that cables are disconnected from any expansion cabinets and that you have labeled the cables for trouble-free reconnection. Protect, coil, and stow the cables in the cabinet base.
- Confirm that all major cable bundles are well-secured.
- Insert anti-static foam between components in the rack.
- Wrap the front and rear doors of the rack in bubble wrap before securely closing them.
- Crate the rack according to the documentation that comes with the rack, including protective wrapping, banding components, and any external packaging.
- Label the crate properly with handling information, using statements such as This End Up, No Forklifts, Top Heavy, and Do Not Double Stack.
- Include tilt watch for X and Y directions and shock watch indicators.

Use these guidelines in addition to rack documentation to secure the rack for transportation.

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Setting Up the Cluster Nodes

Setting up the cluster nodes includes:

- Installing the 64-bit Fibre Channel Host Bus Adapter (HBA) into slot 3 of each node and Gigabit Interface Converters Shortwave (GBIC-SW) into each adapter
- Installing one 9.1-GB or larger internal disk drive on each node
- Installing the public LAN NIC Compaq NC3123 Fast Ethernet NIC (NC3123 NIC) PCI 10/100 WOL into slot 1 for clusters using Ethernet interconnect
- Installing the ServerNet I cluster interconnect

NOTE: No installation is required for Ethernet interconnects, which use the embedded NIC. Refer to the section, "Cabling the Ethernet Interconnect," later in this chapter for installing the Ethernet interconnect cable.

Additional options, such as tape drives, other NICs, and Remote Insight Lights-Out Edition boards can be installed after the cluster Quick Install procedure has completed.

Installing the 64-Bit External Storage Fibre Channel HBA and GBIC-SWs

For a redundant fault-tolerant configuration, the storage system connects to both ProLiant ML370 servers, so an HBA must be installed in each server. Additionally, a GBIC-SW must be installed in each adapter.

The following steps explain how to install the external Fibre Channel HBAs, which are required for the Compaq StorageWorks RAID Array 4100 (RA4100):

NOTE: Refer to the ProLiant ML370 server documentation for general PCI adapter installation information.

1. Install one 64-bit HBA into slot 3 of each node.

IMPORTANT: Only one Fibre Channel HBA is supported in each node.

2. Install one GBIC-SW module into each HBA. For installation instructions, refer to the documentation that comes with the Fibre Channel hardware.

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3. Do not install or update drivers. The Quick Install procedures install the Fibre Channel drivers.

Installing Internal Disk Drives

One 9.1-GB disk drive is required per node. The Quick Install automatically configures each internal drive with a 9.1-GB partition, even if the disk drive is larger than 9.1-GB. This UnixWare partition cannot be modified, and other UnixWare partitions cannot be added to this disk drive. After the Quick Install is completed, non-UnixWare partitions can be added up to the maximum capacity of the disk drive, or other disk drives can be installed for additional partitions.

To install the internal disk drives, refer to the documentation included with the drive and with the ProLiant ML370 server.

Installing the Public LAN NIC into a Cluster Ethernet Interconnect

To connect a cluster using Ethernet interconnect to a public network, install an NC3123 NIC into slot 1 of each node using the documentation that comes with the NIC. This step is not needed for clusters that use the ServerNet I interconnect.

Installing the ServerNet I Cluster Interconnect

If your ProLiant ML370 cluster uses ServerNet I as the cluster interconnect, you must install the ServerNet I PCI adapter into slot 1 of each server. To install the ServerNet I PCI adapter, refer to the documentation that comes with the adapter for general installation guidelines.

- Install one ServerNet I PCI adapter version 1.5e into slot 1 of each node.
- Ignore the ServerNet I driver installation instructions in the adapter installation guide. The required UnixWare ServerNet I device driver is included with the SCO UnixWare 7 NonStop Clusters software and is automatically installed during software installation.
- Ignore the ServerNet I connection testing instructions in the adapter installation guide. The software installation procedure includes testing the connection.

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Setting Up the External Storage Hardware

IMPORTANT: The RA4100 is shipped with a single RAID controller. Each RA4100 array used in Compaq ProLiant Clusters for SCO UnixWare 7 requires an additional, redundant controller.

NOTE: The Quick Install automatically configures an RA4100 drive with a RAID 1 9.1-GB UnixWare partition, even if the disk drive is larger than 9.1-GB. This partition cannot be modified and other UnixWare disk drive partitions cannot be added to this disk drive. After the Quick Install is completed, non-UnixWare partitions can be added up to the maximum capacity of the disk drive, or other disk drives can be installed for additional UnixWare partitions.

The U/300 cluster for the ProLiant ML370 server uses external storage with the following components:

- RA4100 storage subsystem
- Two Compaq StorageWorks RAID Array 4000 (RA4000) controllers, one included in the RA4100 storage
- Two GBIC-SWs, one in each controller
- Two 9.1-GB or larger disk drives
- Fibre Channel cables

To configure the external storage for the U/300 Quick Install cluster, set up the RA4100 storage subsystem according to the following steps:

1. Follow the set-up instructions in the documentation that comes with the subsystem to set up the RA4100.

   Review the section, "Fibre Channel Cable Precautions," later in this chapter for general information.

2. Refer to the user guide for the RA4100 for disk drive RAID array options and considerations.

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3. In each array, install one redundant controller into the lower slot (rack-mount) or into the left slot (tower as viewed from the back) according to the following steps:
   a. Disconnect the power from the storage subsystem.
   b. Remove the cover from the second controller slot.
   c. Rotate the board 180 degrees from the position of the top controller.
   d. Insert the RA4000 redundant controller.
   e. Install the GBIC-SW modules.
4. Ignore the chapters on the Array Configuration Utility and the Options ROMPaq in the documentation for the RA4100. These steps are part of the installation procedure in Chapter 3, "Installing Cluster Software."
5. Install a 9.1-GB or larger disk drive into each slot 0 of the array.

Cabling the Components

Proper cabling can simplify service and assembly of the cluster, so following appropriate cabling standards is vital to a successful cluster setup.

Using Labeling Standards

Proper labeling can prevent improper connections and simplify cluster assembly and service. Make sure to label each server with the correct node labels that are provided.

Also, label the ends of the following cables:

- Ethernet crossover cable (for cluster interconnects using Ethernet)
- ServerNet I cables (for cluster interconnects using ServerNet I)
- Cluster Integrity (CI) serial cable
- Keyboard, monitor, and mouse cables
- Server power cables

Each label must identify the node to which the cable connects.

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Cabling the ServerNet I Interconnect

ServerNet I adapters include X and Y connections for redundancy. Figure 2-1 shows the ServerNet I adapter connections.

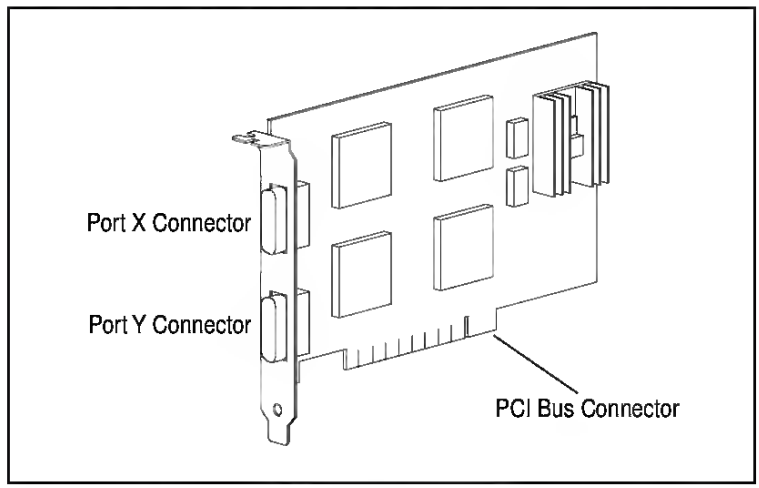

Figure 2-1. ServerNet I PCI adapter connections

IMPORTANT: Cable X and Y to their corresponding counterparts. Do not cable X connections to Y connections.

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The ServerNet I cables directly connect the ServerNet I adapter in node 1 to the ServerNet I adapter in node 2, as shown in Figure 2-2.

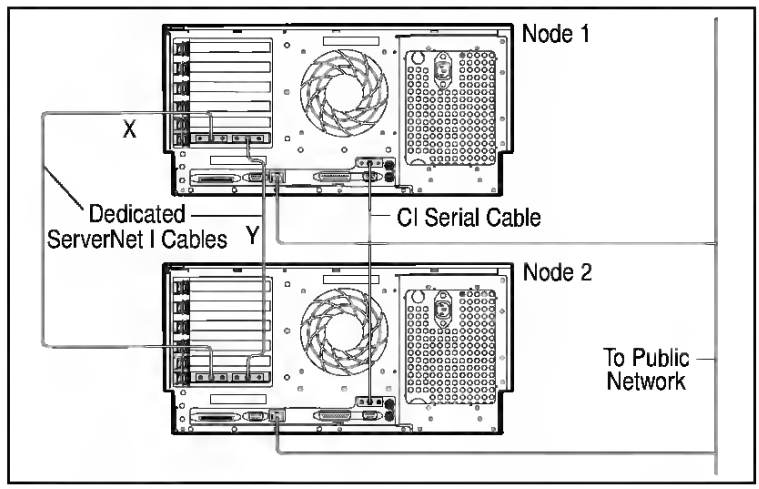

Figure 2-2. Example of cabling the cluster interconnect of a cluster that uses ServerNet I

NOTE: Cabling for the external storage is intentionally not shown.

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Use the cabling suggestions illustrated in Figure 2-3 to label the ServerNet I cables.

Node Number	ServerNet I Switch Port Number	Cable Tie Color
1	0	Pink
2	1	Orange

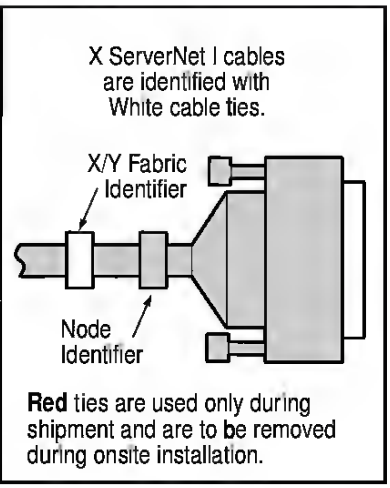
X ServerNet I cables are identified with White cable ties.
X/Y Fabric Identifier
Node Identifier
Red ties are used only during shipment and are to be removed during onsite installation.

Figure 2-3. ServerNet I cable labeling suggestion

To cable the ServerNet I interconnect, follow these steps:

1. Connect a white-labeled ServerNet I X cable to the X connection on the ServerNet I adapter in node 1.
2. Connect the other end of the cable to the corresponding ServerNet I adapter X connection in node 2.
3. Complete the cabling by installing the ServerNet I Y cable in a similar manner.

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Cabling the Public LAN Connection

For interconnects using ServerNet I, connect the public LAN Ethernet cable to the embedded NIC of the servers. See Figure 2-2 earlier in this chapter.

For interconnects using Ethernet, connect the public LAN Ethernet cable to the NC3123 NIC into slot 1 of the servers. See Figure 2-4.

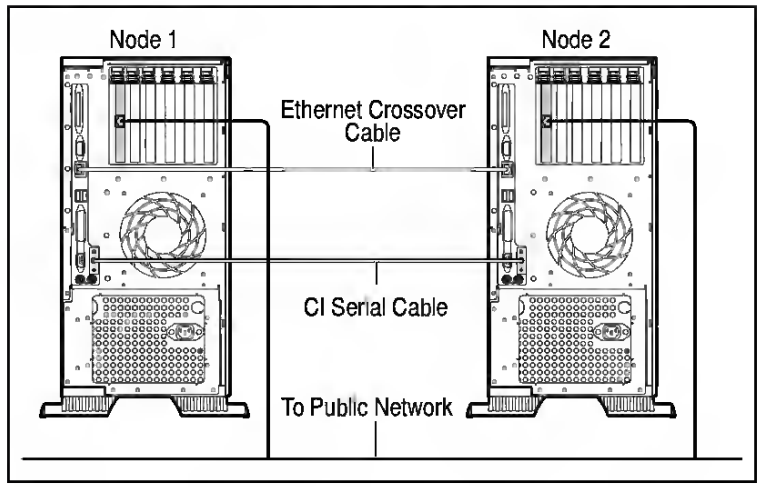

Figure 2-4. Example of cabling the cluster interconnect of a cluster that uses Ethernet

NOTE: Cabling for the external storage is intentionally not shown.

Cabling the Ethernet Interconnect

An Ethernet crossover cable is required for interconnects using Ethernet. To cable the Ethernet interconnect, connect one end of the Ethernet crossover cable to the embedded NIC in node 1. Connect the other end of the Ethernet crossover cable to the embedded NIC in node 2. Figure 2-4 illustrates the proper cabling.

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Cabling the CI Serial Cable

IMPORTANT: The CI serial cable is required.

To cable the CI serial cable, connect one end of the CI serial cable to serial port connector B in node 1. Connect the other end of the CI serial cable to serial port connector B in node 2. Figure 2-2 illustrates the proper cabling for clusters that use ServerNet I interconnect. Figure 2-4 illustrates the proper cabling for clusters that use Ethernet interconnect.

Cabling the RA4100

To cable the RA4100 components, follow these steps:

1. Connect the Fibre Channel cabling between the arrays and nodes using the instructions in the user guide for the RA4100 and the documentation that comes with the Fibre Channel cables. See Figure 2-5 for a cabling illustration.

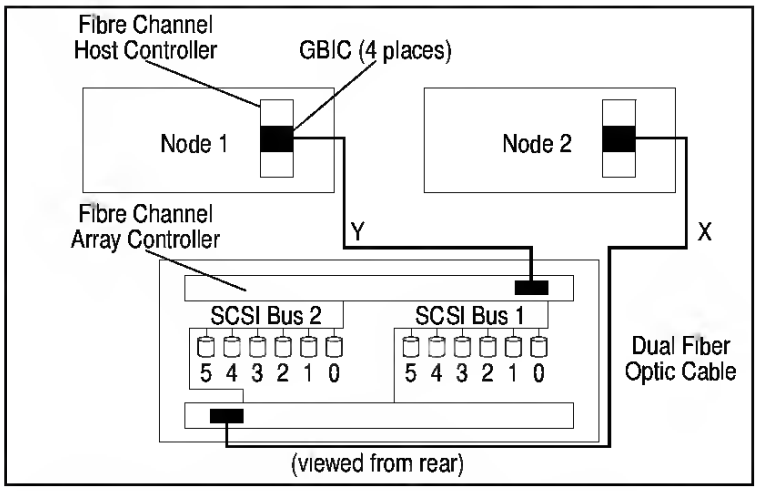

Figure 2-5. Supported cabling of the RA4100 storage subsystem for the U/300 configuration

2. Connect the first RAID controller in the upper slot (rack-mount) or right slot (tower as viewed from the back) of the RA4100 to node 1. Connect the redundant, or second, controller in the lower (rack-mount) or left (tower) slot to node 2.

3. Confirm that all cables are properly connected to the appropriate arrays and servers.

Figure 2-5 shows the supported cabling of the RA4100 storage subsystem for the U/300 configuration.

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Fibre Channel Cable Precautions

Keep the following precautions in mind when installing, handling, moving, connecting, and disconnecting Fibre Channel cables:

- Affix cable labels carefully, without over-tightening, to avoid breaking the glass fibers within the cables.
- Do not bend the Fibre Channel cable into an arc tighter than the minimum allowable bend radius specified by the cable manufacturer. The minimum bend radius is usually 10 to 20 times the outer diameter of the cable. Protect the cables from pinching, abrasion, excess tension, and any other mechanical stress.
- When inserting or removing connectors, handle the Fibre Channel cable only by the connector body, not by the strain relief or by the cable body. Even moderate amounts of tension or pressure on the Fibre Channel cable body can destroy the connector.
- Type SC connectors include a white stripe along each side. Verify that the connectors mate with a positive click and that the white stripe is invisible. If the white stripe is visible, the connectors are not properly mated.
- Do not subject connectors to abrasion, chemical contaminants, or rough handling. Fibre Channel mating surfaces are cut, polished, and aligned to extremely close tolerances, and they are much more sensitive to mishandling than conventional electrical signal connectors.
- Do not allow dust to enter the connectors.
- Leave any protective dust covers on the GBIC-SW whenever it is not connected to a Fibre Channel cable.
- Failures caused by dust contamination or improper cable connector handling can exhibit the same symptoms as a controller or GBIC-SW failure, resulting in an unnecessary component replacement that does not resolve the root cause of the problem.

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Cabling the Keyboard, Monitor, and Mouse

To cable the keyboard, monitor, and mouse, refer to the documentation that comes with these devices.

UPS Power Management Cabling

Compaq ProLiant Clusters for SCO UnixWare 7 support serial data connections from UPS units to ProLiant server nodes in the cluster. This feature provides the cluster with soft shutdown capability when an AC power outage lasts until the UPS batteries approach the end of their holdup period.

To connect the UPS power management cable to the ProLiant server nodes:

1. Locate the cable. The UPS power management cable is a 3.66-m (12.00-ft) serial cable included with most Compaq UPSs.
2. Connect one end of the cable to the COM port on the UPS chassis. Connect the other end of the cable to any unused serial port on any ProLiant server within the cluster. Because the power management software is cluster-aware, you can connect the UPS power management cable to any node in the cluster.

If a second UPS is used, repeat step 2. Connect the UPS serial cable to the other server. Do not connect multiple cables to one server.

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Chapter 3

Installing Cluster Software

Using the Compaq ProLiant Clusters for the SCO UnixWare 7 ML370 Quick Install CDs for the Compaq ProLiant ML370 server to install the SCO UnixWare 7 NonStop Clusters software on a ProLiant ML370 Cluster includes several tasks. Use the following information to install your cluster:

- Understanding Preinstallation Tasks and Considerations
- Configuring the Servers with SmartStart
- Updating Controller Firmware
- Verifying ServerNet I Connections
- Installing the Cluster Using Quick Install
- Verifying the Cluster Assembly
- Additional Cluster Setup Tasks
- Registering the ProLiant Cluster for SCO UnixWare 7
- Viewing UnixWare and NonStop Clusters Documentation

For specific information about individual software components, see the documentation that comes with the component.

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Understanding Preinstallation Tasks and Considerations

Before you begin the software installation, assemble the hardware for the cluster, fill out the Quick Install planning worksheets in Appendix B of this guide, and have four formatted diskettes on hand. Read through this chapter to become familiar with the installation procedures as you fill out the worksheets.

Default Quick Install Settings

Table 3-1 lists the default settings used during the Quick Install installation procedure. These parameters can be modified after the installation is complete by running the International Settings Manager in the System folder of the SCOadmin system administration tool.

Table 3-1
Quick Install Default Settings

Parameter	Default
Locale	C Standard
Keyboard	United States C
Code set	C
Time zone	Configurable to any U.S. time zone

Internal Disk Drive Considerations

Before you begin any procedures in this chapter, do not have any disk drives in the internal storage area other than the one 9.1-GB or larger disk drive. The Quick Install procedures require that only one disk drive reside in each server during the installation.

Obtaining UnixWare 7 Licenses

Before installing the SCO UnixWare 7 NonStop Cluster software, obtain a UnixWare 7 license that includes either the Mirroring Option or an OnLine Data Manager (ODM) license. To locate a convenient SCO reseller or distributor to purchase licenses, see the SCO website at

http://www.sco.com

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Configuring the Servers with SmartStart

Before cluster installation on each node, you must erase any existing configuration and configure each server using the SmartStart CD that comes with the ProLiant ML370 server. You must also set two hardware configuration items on each server. Start with the server that you plan to use as node 1.

Erasing the Configuration

If you are using server or storage hardware that has been previously configured, you must erase that configuration on each node before using the Quick Install CDs for the ProLiant ML370 server. The following steps must be used separately on each node to erase the configuration:

CAUTION: This procedure erases any information currently stored on the node. To prevent information loss, back up important files before attempting installation.

NOTE: The SmartStart procedure may prompt you for the Server Profile Diskette that comes with the server. If prompted, insert the diskette and follow the onscreen instructions.

1. If you are performing this procedure on node 1, power up the Compaq StorageWorks RAID Array 4100 (RA4100) and wait about 90 seconds for the Compaq StorageWorks RAID Array 4000 (RA4000) controllers to complete their Power-On Self-Tests (POSTs).

   If you are performing this procedure on node 2, power down the RA4100.

2. Power up the node, insert the SmartStart CD into the CD-ROM drive for the node, and then wait for SmartStart to boot.

3. Select the Run System Erase Utility icon, and then click **OK**.

4. Click the **Yes** button when prompted to continue. Wait for the configuration to be erased.

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5. If you used the Server Profile Diskette, remove it. Power down the RA4100 if you are erasing the configuration on node 1. When prompted, power down, and then power up only the server.

IMPORTANT: Do not turn the RA4100 back on at this time.

Continue with the following procedure for server configuration. Begin with step 2 because you have erased a previous configuration.

Configuring the Servers

To configure the nodes using SmartStart:

IMPORTANT: The RA4100 must not be powered up during this procedure. Do not configure any RA4100 logical disks prior to software installation; an RA4100 logical disk is automatically configured by the Quick Install procedure.

1. If you did not erase a configuration, power up the server, and then insert the SmartStart CD into the CD-ROM drive for node 1. If you erased a configuration according to the preceding steps, begin with step 2.
2. Select the language at the prompt. The Regional Settings screen displays.
3. Select the country and keyboard type from the Regional Settings screen.
4. Set the date, time, and daylight savings time adjustment if applicable.
5. Click **Next**, and then click **Continue**. The License Agreement displays.
6. Accept the License Agreement to continue. An Installation Path window displays.
7. Select Manual Configuration, and then click the **Begin** button.
8. Click the plus sign (+) preceding the SCO entry in the menu. A list of operating systems displays.
9. Select SCO UnixWare 7.1.1, and then click **Next**. A warning screen displays.
10. Click **Continue**. Wait while the system configuration loads.
11. Use the arrow keys to select Review or modify hardware settings, and press **Enter**. The Steps in configuring your computer window displays.
12. Use the arrow keys to select Step 3: View or edit details, and then press **Enter**.
13. Page down to the Embedded - Compaq Automated Server Recovery entry.

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14. Verify that the following items are disabled:

    - ❑ Software Error Recovery
    - ❑ Standby Recovery Server
    - ❑ UPS Shutdown

    Use the arrow keys to select the options and the **Enter** key to modify them as necessary.

15. Page down to Embedded-Compaq Integrated Dual Channel Wide Ultra2 SCSI Controller (Port2).

    - ❑ Select Controller Order, and then press **Enter**.
    - ❑ Select First and press **F10**. The Configuration Changes screen displays.
    - ❑ Press **Enter** to accept the changes.

16. Press **F10** to exit the Step 3: View or edit details window. The Steps in configuring your computer window displays.

17. Use the arrow keys to select Step 5: Save and exit, and then press **Enter**. The Step 5: Save and exit window displays.

18. Select Save the configuration and restart the computer, and then press **Enter**. A Reboot window displays.

19. Press **Enter**. The Array Configuration Utility loads and an error message indicates that no array controllers were detected. This message is an expected error message.

20. Click **OK** to exit the Array Configuration Utility. The system reboots.

21. Wait while the system partition installation completes. The server reboots and sets up hardware. After multiple reboots, the Compaq SmartStart-Manual Path window displays.

22. Create a firmware diskette at this time if you are completing this step on node 1. You will use this diskette later to upgrade the RA4000 controller firmware. If performing this procedure on node 2, skip this step and continue with the section "Updating Controller Firmware."

    To create a firmware diskette, obtain one DOS formatted diskette, and follow these steps:

    a. Click the **Create Support Software** button.

    b. Click the plus sign (+) next to Compaq.

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c. Page down to Options ROMPaq, select it, and then click **Next**. Although the onscreen instructions indicate that you need 10 diskettes, this procedure creates only a single diskette. A screen for creating the first diskette displays.

d. Click **Skip**. The Firmware Upgrade diskette for the RA4000 Controller displays.

e. Insert the formatted diskette into the disk drive, and then click **OK**.

f. Wait for the software to be written to the diskette.

g. Remove the diskette from the drive after the software has been written to the diskette.

h. Click **Skip** on each of the remaining screens, and then click **Finish** at the final screen to return to the Compaq SmartStart-Manual Path window.

23. Click **Next**. A Compaq SmartStart-Manual Path warning window displays.

24. Remove the SmartStart CD and power down the node.

25. Repeat the procedures for erasing a configuration (if necessary) and configuring servers on node 2. Do not repeat step 22 on node 2.

If you have erased any existing configuration on both nodes of your server and have configured both nodes with SmartStart, continue with the following section, "Updating Controller Firmware" to upgrade controller firmware.

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Updating Controller Firmware

Controller firmware must be updated on both nodes. Use the following procedure to upgrade the controller firmware:

1. Turn on the RA4100 and wait about 90 seconds for the RA4000 controllers to complete their POSTs.
2. Insert the firmware upgrade diskette into the drive. (You made this diskette in the preceding procedure.)
3. Boot the node from the diskette, and then follow the prompts on the screen until the firmware is updated.
4. Remove the firmware diskette and upgrade the controller firmware on node 2 using step 2 and step 3 of this procedure.

   Continue with one of the following procedures when the firmware is updated:

   - Continue with the "Verify the ServerNet I Connections" section for cluster interconnects using ServerNet I.
   - Continue with the "Installing the Cluster Using Quick Install" section for cluster interconnects using Ethernet.

Verifying ServerNet I Connections

NOTE: This section applies only to clusters connected with ServerNet I. If the cluster is connected with Ethernet, proceed to the next section, "Installing the Cluster Using Quick Install."

To verify the ServerNet I connections, create a ServerNet utility diskette for each node. To create the diskettes, download the ServerNet Verification Utilities Softpaq from the following site:

http://www.compaq.com/support

From the welcome window of that site, take the following path:

1. Select software & drivers. A download center window displays.
2. Select servers.

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3. From the options presented to you, select the following:
   - Select your particular server from the list presented to you.
   - Select the appropriate model or All Models.
   - Select SCO UnixWare 7 from the list of operating systems.
4. Select the Softpaq for ServerNet Verification Utilities.

At the download page, follow the directions for downloading the Softpaq and creating diskettes. Create two ServerNet Verification Utilities diskettes.

Verifying the Local Adapter

To verify that the local ServerNet I adapter is properly installed and functional, on each node that has a ServerNet I adapter, follow these steps:

1. Have a ServerNet I Verification Utilities diskette for each server.
2. Insert the proper diskette into the server that you want to test. Reboot the node. Wait for the DOS prompt to be displayed.
3. Type spaf at the DOS prompt, and then press **Enter**. A title screen displays.
4. Press any key to start the test of the ServerNet I links. The following messages display:

   LINK X IS ALIVE

   LINK Y IS ALIVE

   Verify tbat the links are alive. If either link is reported NOT ALIVE, a problem exists with the adapter. Press **Esc** to stop the ServerNet I link test. Power down the server, disconnect all power to the server, reseat the board, and then repeat the test.
5. Press **Esc** to exit the ServerNet I Utility or press any other key to start the loopback test. The loopback test status displays. If a loopback error occurs, the error displays, and the test fails.
6. Press any key to stop the loopback test.

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Verifying Node-to-Node Communication

Node-to-node communication tests include a link test for the cables and a loopback test for the adapters. Use the following steps to verify node-to-node communication on a directly connected ServerNet I two-node cluster:

1. Insert a ServerNet Utility Disk into node 1 and node 2, and then reboot the nodes. Wait for the DOS prompt on the nodes.
2. Type spaf 1 2 at the DOS prompt on node 1, and then press **Enter**. A title screen displays.
3. Type spaf 2 1 at the DOS prompt on node 2, and then press **Enter**. A title screen displays.
4. Press **Enter** on both nodes to start the link test for the cables. The following messages display:

   ```
   LINK X IS ALIVE

   LINK Y IS ALIVE
   ```

   You may see errors on the first node until the second node test starts. Be sure that both nodes have started the test before checking for errors.

   Persistent errors indicate a problem with the cabling between the nodes.
5. Exit the text by pressing **Esc** if errors persist. Resolve the problem before continuing.
6. Press **Enter** on node 1 to begin the loopback test. Test message similar to the following display:

   ```
   spaf: path=0 Loopback=0 Option=1 11/29 14:08:20 600 pages

   spaf: path=1 Loopback=0 Option=1 11/29 14:08:21 600 pages
   ```

   If a loopback error occurs, the test stops and reports the error. The error indicates a problem with the adapter on node 1. Exit the loopback test by pressing **Esc**, and resolve the problem before continuing.
7. Press **Enter** on node 2 to begin the loopback test. Test message similar to the following display:

   ```
   spaf: path=0 Loopback=0 Option=1 11/29 14:08:25 19888 pages
   spaf: path=1 Loopback=0 Option=1 11/29 14:08:26 19999 pages
   ```

   If a loopback error occurs, the test stops and reports the error. The error indicates a problem with the adapter on node 2. Exit the loopback test by pressing **Esc**, and resolve the problem before continuing.
8. Press **Enter** on each node to exit the loopback test.

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Installing the Cluster Using Quick Install

Before beginning the software installation, be sure to have the Quick Install planning worksheets on hand and the following items available:

- Cluster name and Cluster Virtual IP (CVIP) address
- Node 1 hostname and IP address for the public network
- Node 2 hostname and IP address for the public network
- Netmask for the public network
- For clusters using Ethernet interconnect, node 1 hostname and IP address for the cluster interconnect

  Default values of node1-ic and 10.1.0.1 are provided during the installation.
- For clusters using Ethernet interconnect, node 2 hostname and IP address for the cluster interconnect

  Default values of node2-ic and 10.1.0.2 are provided during installation.

IMPORTANT: The public network IP address for node 1 and node 2 and the CVIP address must be on the same Ethernet subnet. The default router must be on the public network subnet. The cluster interconnect IP addresses for node 1 and node 2 must be on a different subnet from the public network.

- For clusters using Ethernet interconnect, netmask for the cluster interconnect interfaces

  A value of 255.255.255.0 is provided during installation.
- UnixWare and NonStop Clusters licenses and an add-on Mirroring Option license or ODM license must be added if the UnixWare licenses do not include mirroring
- Passwords and system owner information
- NonStop Clusters simple network management protocol (SNMP) agent configuration information
- One formatted diskette
- The correct set of Quick Install CDs for the ProLiant ML370 server. Choose either ServerNet I or Ethernet, according to your server and cluster configuration

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Installing Node 1

Before beginning the installation, select the set of Quick Install CDs for your cluster configuration. Choose the CDs for either the ServerNet I cluster interconnect or Ethernet cluster interconnect.

> **NOTE:** To save time, you can install both nodes together. Be sure node 1 has rebooted before rebooting node 2. Insert the CDs into the servers, power up the servers, and follow the procedures for each node at the same time.

To install the software on node 1, follow these steps:

1. Turn on the RA4100 and wait about 90 seconds for the RA4000 controllers to complete their POSTs.
2. Power up node 1, and then insert Quick Install Image CD for node 1 into the CD-ROM drive. Wait while node 1 boots from the CD. A warning message indicates that data will be lost.
3. Press **Enter** to continue, or power down the system to abort the installation.

   The software begins to load and a progress bar indicates the installation progress. When all software has been loaded, several screens request necessary information.
4. Provide the necessary information for the following screens. Each of the screens mentioned in step 3 displays the fields and a brief description of each field as it is selected for entry (for detailed help, press **F1**).

   a. Read responses from previously saved diskette?

   This screen provides the opportunity to restore responses from a previous installation.

   Use the arrow key to select No to skip reading responses or if this is the first installation. Responses can be saved later.

   Use the arrow key to select Yes to read the answers from a diskette and present them as defaults in the remaining screens.

   Use the arrow key to select Force to read the answers from a diskette, and then apply them without modification. The date is assumed to be correct on the system and is not modified.

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b. Date, Time, and Time Zone

Modify the current date, time, and time zone as necessary. Only U.S. time zones are available during Quick Install. Time zone information can be changed after Quick Install by using the UnixWare SCOadmin system administration tools. For more information, see the "Understanding Preinstallation Tasks and Considerations" section in this chapter.

c. Cluster name

Enter the name of the cluster.

d. System owner identity and passwords

Enter the full name of the system owner, the system owner login ID, and the system owner and root passwords. Passwords are not displayed and must be repeated to verify that they are entered correctly.

e. IP interconnect

NOTE: The IP interconnect screen is not displayed during the installation of ServerNet I cluster interconnects.

Accept the default values, or enter the node 1 hostname and IP address for the cluster interconnect, the node 2 hostname and IP address for the cluster interconnect, and the netmask. The Ethernet cluster interconnect addresses must be on the same network.

f. Network configuration

Enter the external network configuration: domain name, CVIP address, netmask, node 1 hostname and IP address for the public network, node 2 hostname and IP address for the public network, and default route. The public network addresses must be on the same network.

g. NSC SNMP agent configuration

Enter the name of the person responsible for the cluster and the location of the cluster. Default values are supplied for the other fields. Each field is described in the lower region of the screen as you tab to the field. Press **F1** for information that can help you to fill out the fields.

h. Save responses

Responses can be saved, except for the date, to a formatted diskette for future installations. Unencrypted passwords are not saved.

A final screen indicates that the installation is complete.

5. Remove the CD, and then press **Enter** to reboot. The SCOadmin license manager automatically runs.

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6. Enter the node 1 UnixWare license, the node 2 UnixWare license, and the NonStop Clusters license. To complete this step, you must have either UnixWare licenses that include the mirroring license, or an add-on license for either the ODM or mirroring.

   After you exit the license manager, the node continues booting.

   NOTE: Node 2 cannot join the cluster until licensing information has been entered on node 1.

Installing Node 2

Before beginning the installation, select the appropriate set of Quick Install CDs for your cluster configuration. Choose the CDs for either the ServerNet I cluster interconnect or Ethernet cluster interconnect.

IMPORTANT: Do not reboot node 2 until after the installation on node 1 is complete and node 1 has been rebooted.

NOTE: To save time, you can install both nodes together. Insert the CDs into the servers, power up the servers, and follow the procedures for each node at the same time.

To install the software on node 2, follow these steps:

1. Power up node 2, and then insert the Quick Install CD for node 2 into the CD-ROM. Wait while node 2 boots from the CD. A warning message indicates that data will be lost.
2. Press **Enter** to continue, or, for clusters using Ethernet interconnect, power down the system to abort the installation.

   The software begins to load and a progress bar indicates the installation progress.

   For clusters using ServerNet I interconnect, wait for a message that indicates the installation is complete, and then skip to step 3.

   For clusters using Ethernet interconnect, when the software has been loaded, a screen displays a request for the Ethernet interconnect information. Continue with the following steps.

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a. Accept the default addresses and netmask or enter the Ethernet interconnect address for node 1, the Ethernet interconnect address for node 2, and the netmask.

IMPORTANT: If you supply information here, this information must match the information that you supplied for the first node. See step 4e of "Installing Node 1" earlier in this chapter. The option to load or save this information to a diskette is not available.

b. Wait for a message that indicates that the installation is complete.

3. Wait for node 1 to complete the installation and reboot.
4. Remove the CD, and then press **Enter** to reboot.

NOTE: Node 2 joins the cluster after the licensing step has been completed on node 1.

Verifying the Cluster Assembly

After the cluster is fully assembled and installed, verify that the cluster is assembled and properly installed. The NonStop Clusters Verification Utility (NSCVU) is automatically installed during software installation.

Run the nscvu command to verify that all of the cluster resources are present. Resources include nodes, processors, memory, controllers, and storage subsystems. If any resources are missing or if file system switch is not correctly operating, refer to Chapter 5, "Troubleshooting," of this guide.

NOTE: The NSCVU requires the SNMP agents to be running on each node. After booting the cluster, wait 15 minutes for all the agents to start on each node before using the NSCVU. Otherwise, the NSCVU reports errors about unavailable data.

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Additional Cluster Setup Tasks

After you have installed your cluster, you can configure the nameserver for the domain name of the cluster or modify the Quick Install default settings outline in Table 3-1.

NOTE: Information about configuring nameservers using the SCOadmin system management tool can be found in the SCOhelp online documentation set. You can use the SCOhelp search tool to locate your information. See "Viewing UnixWare and NonStop Clusters Documentation" later in this chapter.

You can also perform additional hardware set-up tasks, such as installing additional network interface controllers (NICs) for the public network, additional disks and disk volumes, tape drives, and Remote Insight Lights-Out Edition boards. For installation information, refer to the Compaq documentation that comes with these devices.

Registering the ProLiant Cluster for SCO UnixWare 7

After the cluster is verified, go to the Compaq High Availability website to register the cluster. Compaq sends notification to registered users as software updates and additional support for SCO UnixWare 7 NonStop Clusters is made available. To register the cluster, see the Compaq High Availability website at

http://www.compaq.com/highavailability

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Viewing UnixWare and NonStop Clusters Documentation

After the cluster is installed, you can view SCO UnixWare 7 NonStop Clusters documentation. The main documentation system is called SCOhelp and contains information that can answer many administrative questions. Additionally, you can access manual pages using the man(1M) command.

Access the online documentation in the following ways:

- Click the book-and-question-mark icon in the toolbar on the UnixWare Desktop to access SCOhelp. A browser displays the main SCOhelp list of topics.
- Type scohelp at the command line of a desktop terminal (dtterm) to access SCOhelp. A browser displays the main SCOhelp list of topics.
- Use the following URL to remotely access SCOhelp when the cluster is connected to the public network:

  http://*clustername*:457

  Substitute the name of your cluster or its CVIP address for *clustername*. The browser displays the main SCOhelp list of topics.
- Use the man command to access manual pages from any command line by entering man and the name of the command, file, or routine about which you want information. For example, enter:

  man cluster

  The man command displays the reference page for the cluster command.

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Chapter 4

Managing Clusters

Compaq and SCO both provide a variety of software to simplify the management of ProLiant Clusters for SCO UnixWare 7. SCO cluster management software includes:

- Clusterized SCOadmin
- Event Processor Subsystem
- SCO UnixWare 7 NonStop Clusters Management Suite
- Clusterized and cluster-specific command line utilities

Compaq provides the management capabilities customized for use with ProLiant Clusters for SCO UnixWare 7. Compaq management software includes:

- Clusterized Compaq Insight Manager Support
- Uninterruptible Power Supply (UPS)-Initiated Shutdown Configuration

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SCO UnixWare 7 NonStop Clusters Management Software

The single-system image of the Compaq ProLiant Cluster makes managing a cluster similar to managing a single-node, noncluster UnixWare 7 system. The standard SCO documentation is useful for performing the management tasks. Cluster concepts and cluster-specific system administration tasks are documented in the NonStop Clusters Documentation topic in the *SCO UnixWare 7 NonStop Clusters System Administrator's Guide*.

This guide is available in the SCOhelp online documentation set, which you can access in the following ways:

- Click the book-and-question-mark icon in the toolbar on the UnixWare Desktop to access SCOhelp. A browser displays the main SCOhelp list of topics.
- Type scohelp at the command line of a desktop terminal (dtterm) to access SCOhelp. A browser displays the main SCOhelp list of topics.
- Use the following URL to remotely access SCOhelp when the cluster is connected to the public network:

  http://*clustername*:457

  Substitute the name of your cluster or its CVIP address for *clustername*. The browser displays the main SCOhelp list of topics.

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Clusterized SCOadmin

SCOadmin is the SCO UnixWare 7 system administration tool. You can access this tool from the UnixWare desktop by clicking the tree icon in the toolbar. You can also access the tool by entering scoadmin on a command line. The SCOadmin software provided with SCO UnixWare 7 NonStop Clusters has been clusterized for use in a NonStop Clusters environment.

Help information is available from each SCOadmin screen. The scoadmin online documentation supplied with SCO UnixWare 7 NonStop Clusters software describes the tasks that you can perform with SCOadmin software.

The SCOadmin software includes the following management applications:

- Account Manager
- Filesystem Manager
- License Manager
- Login Session Viewer
- Mail Manager
- Netscape Server Administrator
- Print Job Manager
- Printer Setup Manager
- SCOadmin Setup Wizard
- Task Scheduler
- VERITAS Volume Manager
- Virtual Domain User Manager

The following SCOadmin folders provide additional management tools:

- Clustering
- Compaq
- Hardware
- Networking
- Software Management

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Event Processing Subsystem

The Event Processing Subsystem (EPS) is installed during cluster installation. Use the EPS to configure actions and notifications based on system messages (syslogd). See the *SCO UnixWare 7 NonStop Clusters System Administrator's Guide* for more information.

NonStop Clusters Management Suite

The NonStop Clusters Management Suite (NCMS) is installed as part of SCO UnixWare 7 NonStop Clusters and includes:

- Config Manager
- ServerNet Manager
- Keepalive Manager
- Keepalive Configuration Manager
- Samview

Start NCMS by entering the ncms command at a command line prompt or by selecting an application from the Clustering entry in the SCOadmin management program. Each NCMS application includes online help for each screen, available from the **Help** button on the menu bar.

Config Manager

The SCO UnixWare 7 NonStop Clusters Configuration Manager provides a graphical user interface to configure simple network management protocol (SNMP) agents, the EPS, and Compaq Insight Manager support. See the NCMS Configuration Manager help subsystem for additional information.

ServerNet Manager

The SCO UnixWare 7 NonStop Clusters ServerNet Manager provides a graphical user interface to manage the ServerNet I SAN. The ServerNet Manager displays the status of ServerNet I connections as well as advanced ServerNet I configuration information. The ServerNet Manager shows all interconnects as disabled on Ethernet cluster interconnects.

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Keepalive Manager

The SCO UnixWare 7 NonStop Clusters Keepalive Manager provides a graphical user interface to monitor the status of applications currently being managed by the Keepalive subsystem. Applications are placed under Keepalive control through use of the spawndaemon command. See the *SCO UnixWare 7 NonStop Clusters System Administrator's Guide* in the NonStop Clusters Documentation topic in SCOhelp for more information on the Keepalive subsystem.

Keepalive Configuration Manager

The SCO UnixWare 7 NonStop Clusters Keepalive Configuration Manager provides a graphical user interface to create and manage configuration file sets for applications to be monitored by the Keepalive subsystem.

Samview

The SCO UnixWare 7 NonStop Clusters System Availability Monitor (SAM) Viewer displays availability reports for the cluster, nodes, and other devices.

SCO Clusterized Commands

SCO UnixWare 7 NonStop Clusters software includes a number of cluster-specific and clusterized commands to simplify system management in a cluster environment. The following list identifies the key cluster-specific and clusterized commands. Manual pages for commands can be viewed using SCOhelp or using the man command from the command line.

- onnode, onall—Executes a command on a specific node or on all nodes
- migrate, kill3—Sends the running process a migrate request signal
- cluster—Displays node state information and the software version installed
- clusternode_avail—Shows node availability status
- clusternode_num—Displays the current node number
- where—Displays which node is currently serving a file, device, or process
- spawndaemon—Registers processes for restart
- fast—Executes commands on the node with the smallest load
- fastnode—Returns the number of the node with the smallest load

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- clusternode_shutdown—Shuts down a specified node
- nodedown—Halts the specified node without processing
- dbms_guard—Runs the Data Base Management System guard
- ncms—Runs the NonStop Cluster Management Subsystem
- ctsm—Runs the Cluster Time Sync Monitor

The SCO UnixWare commands that are clusterized in SCO UnixWare 7 NonStop Clusters include:

- netstat, inetd, netcfg, rpcbind
- fuser, df, fsck, mknod, sync
- VERITAS commands, mount, umount, mountall, umountall
- init, crash, cron
- id tools, pdi commands
- pmd, brand
- SCOadmin commands
- sar, ps, ipcs, prtconf
- shutdown

The following SCO UnixWare commands interrogate the cluster node on which they are executed. These commands can be used on any cluster node in conjunction with the onnode command.

- nfsstat—NFS and RPC kernel interface statistics
- rtpm—Real-time performance monitor
- psradm—SMP processor administration
- psrinfo—SMP processor information
- pexbind—Exclusive processor bind operation

NOTE: Refer to the SCO UnixWare 7 NonStop Clusters manual pages for additional information on SCO UnixWare commands. View the manual pages with the man command from the command line or through SCOhelp.

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Compaq ProLiant Cluster Management Software for SCO UnixWare 7 NonStop Clusters

Compaq provides the following cluster management capabilities customized for use with Compaq ProLiant Cluster for SCO UnixWare 7 NonStop Clusters. These capabilities are available on the Compaq Management CD shipped with ProLiant servers.

- Compaq Insight Manager Support
- Compaq Insight Manager XE Support
- NonStop Clusters Verification Utility
- UPS-Initiated Shutdown

Compaq Insight Manager Support

Compaq Insight Manager client software runs on Microsoft Win32 desktop computers and remotely connects to the Compaq Management Agents running on a Compaq ProLiant Cluster for SCO UnixWare 7.

Compaq Insight Manager Overview

Compaq Insight Manager is the Compaq Win32 application for managing networked devices. Compaq Insight Manager provides intelligent monitoring and alerting capabilities for the critical systems in a distributed enterprise.

Compaq Insight Manager consists of a Win32 application and a set of server- or client-based management data collection agents. Key subsystems make system health, configuration, and performance data available to the agent software. Agents act upon data by initiating SNMP alarms in the event of faults and by providing updated management information.

Install Compaq Insight Manager on a Win32 desktop computer using the instructions provided on the CD. The nodes within the cluster are interpreted by the Compaq Insight Manager as separate UnixWare 7 systems.

Refer to the user guide included on the Compaq Management CD for more information about Compaq Insight Manager.

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Clusterized Compaq Management Agents

Compaq Management Agents running on a SCO UnixWare 7 NonStop Clusters system support the same client-server interface as a single-server SCO UnixWare 7 system. The client-server interface for Compaq Insight Manager is SNMP-based, which allows ProLiant servers and clusters to be managed by other network management client software.

The clusterized Compaq Management agents are installed during the Quick Install. Each node has its own set of clusterized agents. The agents on a specific node are associated with the primary physical IP address of that node and allow access to information regarding that node.

On the Compaq Management CD that comes with ProLiant servers, the clusterized agents are part of Compaq Management Agents and Tools for Servers for SCO UnixWare 7 NonStop Cluster.

NOTE: The clusterized agents are accessible only through the primary physical IP address for each node, not the CVIP for the cluster.

Compaq Insight Manager XE Support

Compaq Management Agent software runs on ProLiant cluster servers and interacts with the Compaq Insight Manager XE management server using SNMP and Hypertext Transfer Protocol (HTTP) messaging. Compaq Insight Manager XE gives system administrators control through a visual interface, comprehensive fault and configuration management, and remote management. Administrators can access detailed information about the cluster nodes through a Microsoft Windows NT server. A browser is used to monitor and manage the ProLiant Cluster for SCO UnixWare 7.

Compaq Insight Manager XE Overview

Compaq Insight Manager XE simplifies systems management by reducing risk and increasing availability with a robust set of tools for event management, device management, version control, and cluster management. Compaq Insight Manager XE provides server management capabilities that consolidate and integrate management data from Compaq and third-party devices using SNMP, Desktop Management Interface (DMI), and HTTP protocols. Compaq Insight Manager XE provides a single monitoring point for a cluster.

The same Compaq Management Agents used by Compaq Insight Manager are used with Compaq Insight Manager XE. Compaq Insight Manager XE allows you to manage new Compaq and third-party devices without upgrading the management application.

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The Quick Install procedure automatically installs the support needed for Compaq Insight Manager XE. On the Management CD, the package that provides this support is nsccm and is part of the Compaq Management Agents and Tools for Servers for SCO UnixWare 7 NonStop Clusters portion of the CD.

For additional information, refer to the *Compaq Insight Manager XE User Guide* included on the Management CD.

NonStop Clusters Verification Utility

NonStop Clusters Verification Utility (NSCVU) validates Compaq ProLiant Clusters for SCO UnixWare 7 and their components. This utility reports information about the configuration of a newly installed cluster, providing cluster-wide information as well as node-specific information and volume information.

The Quick Install procedure automatically installs the NSCVU. On the Management CD, the package that provides this support is nscvu and is part of the Compaq Management Agents and Tools for Servers for SCO UnixWare 7 NonStop Clusters portion of the CD. For more information, see the description of the Quick Install CDs in Chapter 1, "Clustering Overview," of this guide.

UPS-Initiated Shutdown

The Quick Install procedure automatically installs the UPS software. On the Management CD, the package that provides this support is nscups and is part of the Compaq Management Agents and Tools for Servers for SCO UnixWare 7 NonStop Clusters portion of the CD.

Use UPSs with Compaq ProLiant Clusters to minimize system downtime in the event of power loss. Cable the UPSs to enable the cluster to be cleanly shut down before the UPS battery backup is exhausted. The UPS-initiated shutdown can minimize data loss and improve cluster reboot speed when power returns.

A monitoring process running within the cluster provides the UPS-initiated shutdown. A simple configuration file controls this monitoring process.

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Configuring SCO UnixWare 7 NonStop Clusters for UPS-Initiated Shutdown

The UPS-initiated shutdown is configured by modifying the OS_SHUTDOWN, UPS_LOG_FILE, and UPS_SERIAL_PORT parameters within the /opt/compaq/etc/nscupsd.cfg configuration file.

The OS_SHUTDOWN parameter specifies the battery backup power remaining when a cluster-wide shutdown is initiated. For example, an entry of OS_SHUTDOWN=15 indicates that a cluster-wide shutdown is initiated when the UPS has only 15 minutes of battery backup power remaining. Measure the time required for a clean shutdown of the cluster under peak operating conditions to ensure that the shutdown time is adequate. Use this measurement as a guide for setting the value of OS_SHUTDOWN.

The UPS_LOG_FILE parameter specifies the file containing event information related to UPS state transitions. This parameter defaults to /var/spool/compaq/nscupsd.log and must not be modified.

The UPS_SERIAL_PORT parameter identifies:

- The serial ports to which the UPSs are connected
- The combination of UPS signals required to shut down the cluster

The UPS_SERIAL_PORT parameter is set equal to a listing of serial ports that is separated by colons and semicolons.

Colon-separated serial ports create a pair of UPSs in which both of the UPSs must signal that they are low on power before a cluster shuts down. This pair of UPSs is called a logical UPS. A logical UPS consists of UPSs that together provide fully redundant power to a cluster. The drain of a single UPS within a logical UPS does not result in the loss of any key cluster resources.

> **NOTE:** Use a serial connection to a UPS in determining shutdown only if the node with the serial port is an active member in the cluster.

Semicolon-separated serial ports identify a list of UPSs or logical UPSs. A low-power indication by any of those UPSs results in a cluster-wide shutdown. Use this parameter when a cluster spans multiple power domains and the loss of any one domain results in a cluster-wide shutdown to protect the cluster.

The following section clarifies the use of the UPS_SERIAL_PORT parameter.

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Two-Node Cluster with a Single Power Supply in Each Node

When using a two-node cluster with two UPSs, as shown in Figure 4-1, configure the UPSs so that the cluster shuts down only if both UPSs are low on power. The loss of a single physical UPS results in the loss of one of the nodes but not the loss of the cluster. In this configuration, both UPSs are combined into a single logical UPS, which results in a UPS_SERIAL_PORT configuration of:

```
UPS_SERIAL_PORT=/dev/tty00.1:/dev/tty00.2
```

where /dev/tty00.1 is the device identifier for the node 1 serial port tied to UPS 1, and /dev/tty00.2 is the device identifier for the node 2 serial port tied to UPS 2.

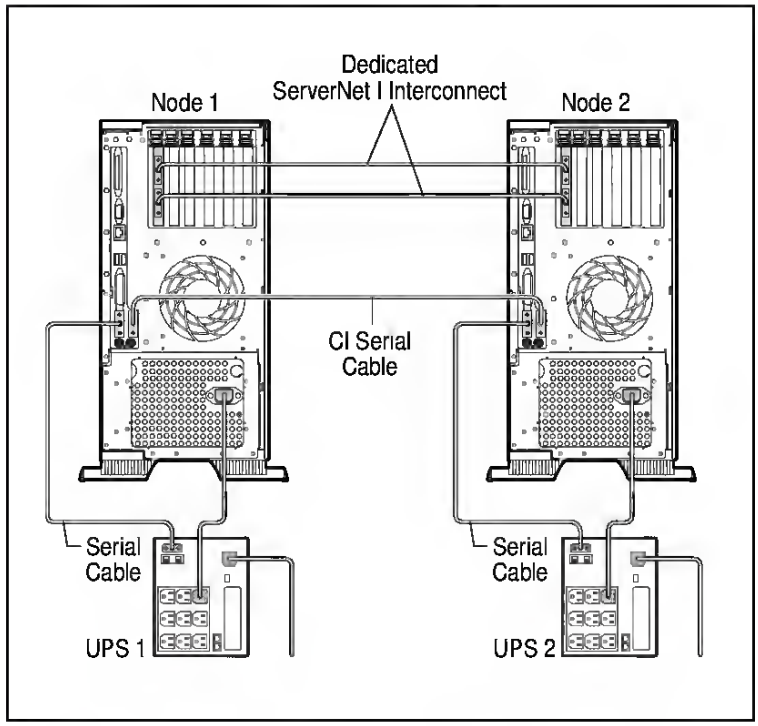

Figure 4-1. Power system for two-node cluster using ServerNet I cluster interconnect

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Chapter 5

Troubleshooting

Carefully follow the detailed instructions provided in this guide to avoid unnecessary problems. For difficulties that do arise while installing, configuring, testing, and operating Compaq ProLiant Clusters for SCO UnixWare 7, refer to the following troubleshooting sections:

- Installation Problems
- Quick Install Error Messages
- Node-to-Node Communication Problems
- Shared Storage Problems
- Client-to-Cluster Connectivity Problems
- Cluster Resource Problems
- ServerNet I Messages

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Installation Problems

This section addresses problems relating to installation of SCO UnixWare 7 or SCO UnixWare 7 NonStop Clusters.

Table 5-1
Solving Installation Problems

Problem	Possible Cause	Action
Server unit does not power up	Power cord or power source	Check all power cords to ensure that they are fully inserted into the power supply plug and the outlet.
	Power supply circuit breaker	Reset the power supply, power distribution unit (PDU), or UPS circuit breaker.
No console output	Keyboard, mouse, or monitor cabling	Verify the cabling for correctness.
Console output is from the wrong server	Node selection	Verify that you have the correct server selected through the Keyboard/Monitor/Mouse switchbox. Press the **PrintScrn** key for a menu of possible connections.
Node performance is sluggish or the node fails	Inadequate memory	Verify that the node has at least the minimum 64-MB of RAM required by SCO UnixWare 7 NonStop Clusters and enough for the applications running on the node.
	Inadequate swap space	Add swap space using the swap(1M) command.
	Node overloaded	Upgrade the node or redistribute the applications throughout the cluster.

continued

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Table 5-1
Solving Installation Problems *continued*

Problem	Possible Cause	Action
Error messages regarding the Cluster Integrify (CI) serial cable display	The CI serial cable is not properly installed	Install the CI serial cable between node 1 and node 2 using the serial port connector B on each node.
StorageWorks RAID Array 4000 redundant array controller firmware does not update	Bad connection to the RA4000 controller	Verify that the host bus adapter (HBA), GBIC-SWs, cables, hubs, and controllers are properly installed. Refer to the documentation that comes with the product for more troubleshooting information.
	Uncertified hardware configuration (server or storage)	Verify that the servers and storage subsystems are on the certified hardware list for ProLiant clusters. See the certified hardware listing at http://www.compaq.com/highavailabilify
	Failed RA4000 controller	Verify the functionalify of the RA4000 controller as described in the *Compaq Fibre Channel Troubleshooting Guide*. Replace the controller as necessary.

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Quick Install Error Messages

This section addresses errors relating to Quick Install installation.

Table 5-2
Quick Install Error Messages

Error Message	Possible Cause	Action
No disks found	No internal disk drive	Add a 9.1-GB or larger disk drive and configure the system with the SmartStart. See Chapter 2, "Setting Up Cluster Hardware" and Chapter 3, "Installing Cluster Software" of this guide.
	Server not configured with SmartStart	Follow the instructions for configuring the server with the SmartStart. See Chapter 3 of this guide.
	No Fibre Channel HBA	Install the Fibre Channel HBA adapter, follow the cabling instructions, and configure the server with the SmartStart. See Chapter 2 and Chapter 3 of this guide.
	Failed Fibre Channel HBA, GBIC-SW, cable, or StorageWorks RAID Array 4100 storage subsystem	Replace failed component.
	No disks drives (or only 1) in RA4100	Add disk drives as described in Chapter 2 of this guide.
	RA4100 disks drives in nonmatching slots	Add disks drives as described in Chapter 2 of this guide
Installation terminates with the following message: FATAL: missing interconnect hardware	ServerNet CDs used for Ethernet cluster installation	Use the correct CDs for the configuration of the cluster.

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Node-to-Node Communication Problems

This section addresses problems relating to node-to-node communication.

Table 5-3
Solving Node-to-Node Communication Problems

Problem	Possible Cause	Action
New node does not join the cluster	Ethernet crossover cable is not correctly cabled or is defective	Verify that the Ethernet crossover cable is connected as described in Chapter 2 of this guide.
	Embedded NIC is not correctly functioning	Verify that the embedded NIC is correctly configured.
	UnixWare 7 licenses are not correct for the node	Verify that you have the proper UnixWare 7 licenses on the node, including the base UnixWare 7 license and licenses for number of processors, users, features, and so on.
	ServerNet PCI adapter (SPA) is not correctly functioning	Verify the SPA using the ServerNet I Verification Utility (SVU) as described in Chapter 3 of this guide.
	SPA is not correctly cabled or a ServerNet I cable is defective	Verify the ServerNet I connections using the SVU as described in Chapter 3 of this guide.
Node 2 does not join the cluster and displays a FATAL: SBA Error message	Ethernet interconnect addresses do not match between node 1 and node 2.	Boot node 2 with the Quick Install CD, perform the installation steps, and enter interconnection addresses that match node 1. See Chapter 3 of this guide.
	Network not connected with Ethernet crossover cable	Connect the cable as described in Chapter 2 of this guide.

continued

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Table 5-3
Solving Node-to-Node Communication Problems *continued*

Problem	Possible Cause	Action
Existing node does not rejoin the cluster	Node hardware failure	Disconnect the node from the cluster. Diagnose and repair hardware failures as a stand-alone ProLiant server.
	Ethernet crossover cable is not correctly cabled or is defective	Verify that the Ethernet crossover cable is connected as described in Chapter 2 of this guide.
	Embedded NIC is not correctly functioning	Verify that the embedded NIC is correctly configured.
	SPA is not correctly functioning	Verify the SPA using the Compaq ServerNet Verification Utilify (SVU) as described in Chapter 1, "Clustering Overview" of this guide. Replace if necessary.
	Node hardware failure	Disconnect the node from the cluster. Diagnose and repair hardware failures as a stand-alone ProLiant server.
	Both X and Y ServerNet I cables are damaged Note: Damage can occur if cables are improperly secured and both cables are severely crimped when a rack-mount server on a slide-rail is pushed back into a rack.	Check the ServerNet I cables to determine that the cables are properly connected and do not have bent pins. If necessary, replace the ServerNet I cables and reboot the node. If the node now joins the cluster, verify that the X and Y ServerNet I connections are properly working by using the ServerNet I graphical monitor or the ServerNet I command line diagnostic (spam).
	Mismatched kernels	Redo the dependent node install on any node that does not have the latest kernel. In the future, ensure that all nodes are operating when building kernels.

continued

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Table 5-3
Solving Node-to-Node Communication Problems *continued*

Problem	Possible Cause	Action
Alternating root node panics (RA4100 system)	RA4100 storage subsystems or hubs are not powered up	Apply power to the hubs and storage subsystems.
	Ethernet connection failed (and the CI serial cable is not used)	Power down the cluster. Check the Ethernet crossover cable to determine that the cable is properly connected, or is not crimped or compromised in any way. If necessary, replace the Ethernet crossover cable. After the Ethernet connection is repaired, boot the cluster.
	Both ServerNet I connections failed (and the CI serial cable is not used)	Power down the cluster. Check the ServerNet I cables to determine that the cables are properly connected, do not have bent pins, and are not crimped or compromised in any way. If necessary, replace the ServerNet I cables. Verify the ServerNet I connections using the SVU as described in Chapter 3 of this guide. After the ServerNet I connections are repaired, boot the cluster.

continued

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Table 5-3
Solving Node-to-Node Communication Problems *continued*

Problem	Possible Cause	Action
Alternating root node panics	ServerNet I cross-cabled in two-node cluster (and the CI serial cable is not used)	Power down the cluster. Verify that ServerNet I is cabled between cluster nodes (X to X and Y to Y) as described in Chapter 2 of this guide. Correct the cabling and boot the cluster.
ServerNet I link exception errors are reported	ServerNet I cable is defective	Verify that the ServerNet I cables are properly connected, do not have bent pins, and are not crimped or compromised in any way. If necessary, replace the ServerNet I cables. ServerNet I cables can be damaged if improperly secured or crimped when a rack-mount server on a slide-rail is pushed back into a rack.
	SPA is defective	Eliminate the ServerNet I cable as a possible cause. Then, verify the SPA functionalify by using the ServerNet I graphical monitor or the ServerNet I command line diagnostic (spam). See the spam(1M) man page for additional information.

continued

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Table 5-3
Solving Node-to-Node Communication Problems *continued*

Problem	Possible Cause	Action
Bad packets or ServerNet I barrier errors reported	SPA is defective	Cluster Membership Service (CLMS) master (the active root node) is unable to communicate with a node during startup or normal operation. If a node does not join the cluster, verify that the SPA is functioning on that node using the SVU as described in Chapter 3 of this guide. If all nodes have joined the cluster, verify ServerNet I functionality by using the ServerNet I graphical monitor or the ServerNet I command line diagnostic (spam). See the spam(1M) man page for additional information. Replace the SPA if necessary.
Intermittent ServerNet Advanced Interface Logic (SAIL) freeze, link level self-check errors, or performance degradation	ServerNet I board installed in the wrong slot	Install the ServerNet I board into slot 1. For more information on the certified server listing see the Compaq High Availability website at http://www.compaq.com/highavailability
	Defective or uncertified PCI board	Identify the PCI board that overuses the PCI bus, hampering SPA operation. Remove the offending PCI board.

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Shared Storage Problems

This section addresses problems that can be encountered in clusters using the Compaq StorageWorks RAID Array 4100 storage system. This section does not address RA4100 storage system problems specific to the storage system itself. For those issues, see the user guide for the RA4100 and the Fibre Channel troubleshooting guide.

Table 5-4
Solving Shared Storage Problems

Problem	Possible Cause	Action
Drives in the RA4100 are not recognized	Drive problem	Replace the bad drive.
	Hardware errors or communications problems, or cluster does not support the disk drive	Use the SCOadmin event viewer to verify that no hardware errors or transport problems exist. Check the event log for disk I/O error messages or indications of problems with communications transport. See the documentation that comes with the product for more information.

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Table 5-4
Solving Shared Storage Problems *continued*

Problem	Possible Cause	Action
"Unable to initialize FC loop" error message displays	Failed or disconnected FC-AL (hub, adapter, or controller)	Diagnose and isolate the problem using the information contained in the user guide for the RA4100 and the Fibre Channel troubleshooting guide. Replace any defective component.
Unstable loop errors resulting in the adapter being taken offline	GBIC-SW laser has malfunctioned	Shut down the node containing the adapter and use that node to diagnose and isolate the problem using the information contained in the user guide for the RA4100 and the Fibre Channel troubleshooting guide. Replace any defective component.
Storage performance is marginal on a FC-AL system	Cache modules on the array controllers do not match	Verify that the cache module on each RA4100 controller is properly seated. If necessary, replace one cache module so that the cache levels match on both array controllers.

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Client-to-Cluster Connectivity Problems

This section addresses problems relating to client-to-cluster connectivity.

Table 5-5
Solving Client-to-Cluster Connectivity Problems

Problem	Possible Cause	Action
Clients cannot communicate with a node (or nodes) over Ethernet	Improper name resolution	Verify that the /etc/resolv.conf file within the cluster indicates the correct domain name servers. Verify that the domain name system (DNS) is properly configured.
	No network connectivity	Verify network cabling connections.
	Transmission Control Protocol/Internet Protocol (TCP/IP) is not properly configured	Configure TCP/IP using SCOadmin networking tools.
	Public network interface IP address is invalid	Reconfigure public network interface IP addresses for the network boards within the cluster using SCOadmin networking tools.
Clients do not see the cluster	Cluster Virtual IP (CVIP) address is invalid	Reconfigure the CVIP address using SCOadmin networking tools.
	CVIP address is not on the same subnet with a public network interface within the cluster	Make sure that the CVIP address is on the same subnet as at least one or more public network interfaces within the cluster.

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Table 5-5
Solving Client-to-Cluster Connectivity Problems *continued*

Problem	Possible Cause	Action
CVIP is not accessible after a node failure	Cluster virtual interface has no available public network interfaces on the same subnet	Configure the cluster so that at least two public network interface NIC boards on two different nodes have IP addresses on the same subnet as the CVIP address. This configuration allows the CVIP to swtich to another public network interface if the primary public network interface is lost. See the *SCO UnixWare 7 NonStop Cluster System Administrator's Guide* for more information on CVIP.
set_id() failed; Invalid argument message displays Intermittent failure occurs when attempting to Telnet to the cluster.	Missing, expired, or invalid license	Make sure that there is a valid license for node 2.

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Cluster Resource Problems

This section addresses problems relating to cluster resources.

Table 5-6
Solving Cluster Resource Problems

Problem	Possible Cause	Action
Device is not seen on all nodes in a cluster	Mismatched kernels	Ensure that all nodes are in the cluster, and then reboot node 2.
	Not all nodes have been rebooted after kernel change	When installing a software package that includes a loadable kernel module and requires a node reboot, ALL nodes in the cluster must be rebooted by using the cluster-wide reboot (shutdown-i6).
Not all processors seem to be usable	Incorrect UnixWare licenses on a node	Update the UnixWare licenses for that node through the SCOadmin license manager so that all processors are properly licensed. Perform a clusternode_shutdown and reboot that node.
Not all of the memory in a node is used	Incorrect UnixWare licenses on a node	Update the UnixWare licenses for that node through the SCOadmin license manager so that use of the full memory is properly licensed. Perform a clusternode_shutdown and reboot that node.

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ServerNet I Messages

Use this section to interpret and respond to the following types of messages:

- ServerNet I SAN Error Messages
- ServerNet I Notice Messages
- ServerNet I Warning Messages
- ServerNet I Panic Messages
- ServerNet I Continuation and Informative Messages

For information about ServerNet, see the *NonStop Clusters for the SCO UnixWare 7 System Administrator's Guide* located in the SCOhelp online documentation set. See Chapter 4, "Managing Clusters," for information about viewing NonStop Clusters documentation.

ServerNet I SAN Error Messages

The ServerNet I PCI Adapter Driver (SPAD) sends ServerNet I SAN messages to the system console and system log for the local node (/var/adm/log/osmlog.*n*, where *n* is the local node number). This section lists all of the SPAD messages, describes what they mean, and indicates what to do if they occur.

All SPAD messages fit the following general format:

SEVERITY: [SNET] *Message_string*

An example of a SPAD message is:

NOTICE: [SNET] Switching to path X

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Table 5-7 lists the text strings for severity, explains what the text strings mean, and references the tables containing the message details.

Table 5-7
ServerNet I Message Severity

Severity	Description	Table Containing Message Details
NOTICE	Messages that indicate that a recovery from a fault has occurred	Table 5-9
WARNING	Messages that report fault conditions that the system administrator needs to know; messages that indicate a serious problem that can warrant action.	Table 5-10
PANIC	Messages that report a catastrophic failure; the SPAD can no longer continue operation. The local node has dropped out of the cluster	Table 5-11
None (blank)	Continuation of a previous message or an informative message not associated with a fault	Table 5-12

Most messages include variable strings that are filled in when the event causing the message occurs.

Table 5-8
ServerNet I Message Variables

Variable Description	Represented as:
ServerNet I ID for a node (hexadecimal)	0xF0nnn
Other hexadecimal data, such as memory addresses or status words	0xnnnnnnnn
Alphanumeric or decimal character string	Nnnnnnnn
Single character, such as ServerNet I path X or Y, or SPA (SHIP) 1.5 Rev C or E	N

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ServerNet I Notice Messages

This section addresses ServerNet I Notice Messages.

Table 5-9
ServerNet I Notice Messages

Messages	Description	User Action
Barrier failed on path:n snetID:0xF0nnn curpath:n Barrier succeeded on path:n snetID:0xF0nnn curpath:n	These messages display when a new node attempts to join a cluster. The message indicates whether the new node is able to communicate with the target node over the given path (X/Y). If a path is cabled, a success message is expected. If the path is not cabled (for example, X side cabled and Y side not cabled), a failure message is expected for that path.	If a barrier transaction fails when it is expected to succeed, there is a problem with the path. Check the cabling and ServerNet I switch (ensure that it is powered up) on the indicated path to the indicated node.
Identified ServerNet I PCI adapter: SHIP 1.5 Rev n	This informative message displays during system initialization to report the revision of the SPA identified by the SPAD.	None

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Table 5-9
ServerNet I Notice Messages *continued*

Messages	Description	User Action
Link exception condition on path n has been resolved. Re-enabling path n	Indicates that a link exception condition on a path is resolved and that link exception detection and processing is re-enabled for that path. The path becomes available for ServerNet I communications within the next minute. Link exception reporting must be enabled (see spam –l on command) for this message to be displayed.	None
Successfully recovered from frozen SAIL	Indicates that the SAIL application-specific integrate circuit (ASIC) stopped responding due to an internal self-check problem (usually from being held off of the PCI bus too long). After detecting the self-check, the ASIC is reset and processing resumes.	None
Switching to path n	Indicates that the SPAD cannot communicate over the current path, so SPAD is attempting to switch to the other path to determine if SPAD can communicate over the path.	Check cabling on the path being switched from. Use the onall spam –v command to find the path that is down.

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ServerNet I Warning Messages

The warning messages are listed in Table 5-10. Messages are listed in alphabetical order except where a series of messages associated with a single-fault condition are grouped together. These groups are alphabetized under the first message in the series. If you cannot find a particular message, look toward the end of the table where multiple messages having the same description are grouped together and are not in alphabetical order.

Table 5-10
ServerNet I Warning Messages

Messages	Description	User Action
bte status immediately after SC status = nnnnnnnn sc_to =nnnnnnnn int_mode = n	This message follows a SAIL ASIC self-check. It indicates that after the SAIL ASIC self-check recovery procedure completed, the block transfer engine (BTE) status register contained an incorrect value and had to be reinitialized, probably because a second self-check occurred during recovery of the first self-check.	None. If the SAIL ASIC self-checks occur too frequently, the node drops from the cluster. In this case, reboot the node so it rejoins the cluster.
(0xF0nnn) Halt received on n port	Indicates that a ServerNet I HALT command was received on the specified port (X or Y). This command stops the transmitter/receiver on that port. This message is typically caused by an uncabled ServerNet I port being near a source of electrical noise.	Ensure that the cabling in the identified port is properly installed.

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Table 5-10
ServerNet I Warning Messages *continued*

Messages	Description	User Action
(0xF0nnn) Multiple link exceptions detected on path n (0xF0nnn) Disabling path n until the condition is corrected (0xF0nnn) Verify that path n is cabled properly	This series of messages indicates that a burst of link exceptions was detected on a ServerNet I path. Link exception reporting must be enabled (see spam –l on command) for these messages to be displayed.	Check the cabling at the local node on indicated the path.
NAK on ServerNet I Barrier request (status=0xnnnnnnnn)	Indicates that a NAK (negative acknowledgment) was received as the result of a barrier request that did not successfully complete. A problem may exist with the associated path.	None. Watch for additional [SNET] messages.
Path n still disabled due to link exceptions. Verify that path n is properly cabled. No more warnings regarding path being disabled are printed until the condition is corrected.	This series of messages indicates that a continuous burst of link exceptions was detected. As a result, link exception reporting is turned off for this path until the condition is corrected.	Check cabling at local node on indicated path.
0xF0nnn: rcvd invalid interrupt packet, src=0xnnnnnnnn 0xF0nnn: rcvd packet w/invalid address, addr=0xnnnnnnnn src=0xnnnnnnnn 0xF0nnn: rcvd packet w/invalid path, path=n, src=0xnnnnnnnn 0xF0nnn: rcvd packet w/invalid source, addr=0xnnnnnnnn src=0xnnnnnnnn 0xF0nnn: rcvd packet w/ invalid permissions, addr=0xnnnnnnnn src=0xnnnnnnnn	These messages indicate that a ServerNet I interrupt packet was received and the packet itself, or information in the packet, is invalid, which may indicate problems with the SPAD or hardware and can result in [SNET] timeout messages.	None. Watch for additional [SNET] messages.

continued

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Table 5-10
ServerNet I Warning Messages *continued*

Messages	Description	User Action
0xF0nnn: rcvd spurious packet acknowledge, src=0xnnnnnnnn	Indicates that an unexpected packet acknowledgment arrived. Usually this message can be linked with a [SNET] timeout message. The acknowledgment from the packet that was timed out arrived late.	None. Watch for additional [SNET] timeout messages.
ship_PCI_initialize: driver does not support cm_ver #n – initialization may fail	Indicates that initialization of the SPA can fail because the version of the UnixWare kernel autoconfiguration subsystem does not match the version expected by the SPAD	None. Watch for additional [SNET] timeout messages.
The SAIL on the SHIP board has frozen	Indicates that the SAIL ASIC stopped responding due to an internal self-check problem (usually from being held off the PCI bus too long). This self-check condition is recoverable. The ASIC is reset and processing resumes.	None. However, if this message is frequently repeated, move the SPA to a higher priority slot on the PCI bus. If that does not help, other PCI boards in the node can be consuming the PCI bus and preventing the SAIL ASIC from obtaining the access that it needs.
The SAIL on the SHIP board has frozen (IIF_SELF_CHECK)	Indicates that the SAIL ASIC stopped responding. This is an unrecoverable condition. This message is followed by a dump of the SAIL ASIC registers and a panic message.	Replace the SPA.
Nnnnnnnn: Timeout on both paths	Indicates that a SPAD operation trying to communicate with another node in the cluster has timed out. This message could indicate that the path is down, that a node in the cluster is powered down, or that a problem exists with the driver and/or hardware. If a path is down, a path switch notice message displays.	Check the ServerNet I cabling. Ensure that the switch is powered up.

continued

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Table 5-10
ServerNet I Warning Messages *continued*

Messages	Description	User Action
(0xF0nnn) exception queue error (0xF0nnn) transmitter write response overflow (0xF0nnn) receiver read request overflow (0xF0nnn) interrupt queue overrun	These messages indicate hardware error conditions were detected during interrupt processing. Queue overruns and transmitter/receiver overflows indicate a potential loss of a response due to buffer space exhaustion.	None. If the node drops out of the cluster later, these messages can be useful in determining what happened.
(0xF0nnn) low condition on external LSERR input detected (0xF0nnn) illegal burst on the i960 bus detected (0xF0nnn) invalid register access on the i960 bus detected (0xF0nnn) error pulse on the external PCHK input detected (0xF0nnn) data parity error detected (0xF0nnn) address parity error detected (0xF0nnn) multiple address or data parity errors have occurred	These messages indicate hardware error conditions detected during SPAD interrupt processing. These errors are all related to access errors in the SAIL ASIC.	None. If the node drops out of the cluster later, these messages can be useful in determining what happened.

ServerNet I Panic Messages

The ServerNet I panic messages are listed in Table 5-11. Most of the messages are in alphabetical order. However, if you cannot find a particular message, look toward the end of the table where multiple messages having the same description are grouped together and are not in alphabetical order.

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Table 5-11
ServerNet I Panic Messages

Messages	Description	User Action
avt_init: unable to allocate virtual mem for AVT	Indicates a shortage of memory on the local node	Check memory utilization and distribution in the kernel tunables. If possible, take crash dump for analysis by product support personnel.
(0xF0nnn) internal SAIL logic error detected	An internal problem with the SAIL ASIC was detected. The SPA has failed.	Run offline diagnostics. If the SPA fails diagnostics, replace the SPA.
intr_init: spawn_daemon_thread failed	Indicates that an attempt to spawn a kernel daemon thread failed. Because this daemon is vital to the SPAD, if it fails to start, the initialization sequence is aborted.	Reboot the node into the cluster.
SAIL frozen; see SAIL state printed above	This message is preceded by a warning message indicating that the SAIL ASIC is frozen and a dump of the SAIL registers. This message indicates that the SAIL ASIC has stopped responding in such a way that it is not recoverable.	Run offline diagnostics. If the SPA passes diagnostics, reboot the node into the cluster. If the SPA fails diagnostics or fails to join the cluster after passing diagnostics, replace the SPA.
SAIL frozen; unrecoverable snet self check - source =nnnnnnnn	Indicates that the SAIL ASIC stopped responding in such a way that it is not recoverable. This error message is preceded by a dump of the SAIL registers.	Run offline diagnostics. If the SPA fails diagnostics, replace the SPA.

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Table 5-11
ServerNet I Panic Messages *continued*

Messages	Description	User Action
ship_PCI_initialize: Found n ServerNet I PCI adapters—currently only one ServerNet I PCI adapter supported	Indicates that during the discovery and initialization of the SPA, more than one SPA was found	Ensure that only one SPA 1.5 revision E is installed in the local node. With one SPA in the node, run the resource manager (resmgr) command and verify that the SPA (displayed as "ship" in the report) displays only once. If it displays twice, use resmgr to remove the entry having the most empfy fields, use idconfupdate to update the system configuration files, and then reboot the node.
ship_PCI_initialize: No ServerNet I PCI adapter found	Indicates that during the discovery and initialization of the SPA, no SPA was found	Ensure that an SPA 1.5 revision E is installed in local node. Run the resource manager (resmgr) command and verify that the SPA (displayed as "ship" in the report) is listed.
ship_init: Unknown revision of the SAIL ASIC detected CIN=0xnnnnnnnn	The SAIL ASIC detected is not revision A or revision B	Replace the SPA with a 1.5 revision E SPA in the local node.
ship_init: Unknown revision of the ServerNet I PCI adapter found Rev ID=0xn	Indicates that during the discovery and initialization of the SPA, an unknown revision of the SPA was detected. The SPA driver recognizes a number of versions of the SPA. ProLiant Clusters for SCO UnixWare 7 support only the 1.5 Rev C and 1.5 Rev E SPAs.	Replace the SPA with a 1.5 revision E SPA in the local node.
ship_init: Unsupported MITE-based ServerNet I PCI adapter detected Unsupported MITE-based ServerNet I PCI adapter found	These messages indicate that during the discovery and initialization of the SPA, a MITE-based SPA was found. MITE-based SPAs are not supported by ProLiant Clusters for SCO UnixWare 7.	Ensure that the SPA is version 1.5 revision E. If so, the SPA configuration files may be corrupt. Call product support personnel.

continued

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Table 5-11
ServerNet I Panic Messages *continued*

Messages	Description	User Action
ship_init: Unsupported revision of the SAIL ASIC detected CIN=0xnnnnnnnn	Indicates that an SPA was found, but the SAIL ASIC on it is not a recognized revision. The driver recognizes revisions A and B of the SAIL ASIC; however, B is the only revision supported by Compaq ProLiant Clusters for SCO UnixWare 7.	Replace the SPA with a version containing revision B of SAIL ASIC (SPA 1.5 revision E).
SHIP_INTCAUSE_QIP7 already set	This interrupt line is being used to help flush the SAIL ASIC register values to memory. When it is about to be used, it must not already be set. If it is set, a software or hardware error has occurred.	Reboot the node into the cluster.
The PLX_ABORT_ACTIVE bit is set (shipintr())	Indicates that the PLX chip aborted a PCI operation. A previous SPA read or write operation has been aborted. This condition could lead to unreported data loss or corruption, so SPA operations are halted with a PANIC.	Run offline diagnostics. If the SPA passes diagnostics, reboot the node into the cluster. If the SPA fails diagnostics, replace the SPA.
bte_memreserve: insufficient physically contiguous memory intr_memreserve: insufficient physically contiguous memory initSail: Insufficient memory for Interrupt State Block dump	These messages display during initialization and indicate that not enough memory is available.	Check memory utilization and distribution in the kernel tunables. If possible, take crash dump for analysis by product support personnel.

continued

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Table 5-11
ServerNet I Panic Messages *continued*

Messages	Description	User Action
avt_define_q: invalid interrupt queue size: nnnn Invalid parameters on ServerNet I Request Invalid status on ServerNet I Request: 0xnnnnnnnn bte_error: Invalid BTE command descriptor intr_init: qintr_map failed ioint: invalid ioaddr 0xnnnnnnnn ship_init: physmap failed PHYS_TO_VIRT: invalid address 0xnnnnnnnn allocSNdev: out of sndev table space snetConfig: bad cmd n snetOpen: invalid mode 0xnnnnnnnn	These messages are all SPAD (software) errors.	If possible, take crash dump for analysis by product support personnel. Reboot the node into the cluster.

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ServerNet I Continuation and Informative Messages

The ServerNet I continuation and informative messages are listed in alphabetical order in Table 5-12.

Table 5-12
ServerNet I Continuation and Informative Messages

Messages	Description	User Action
AVT entry 0xnnnnnnnn @ 0xnnnnnnnn: I/O Address 0xnnnnnnnn, Type = Data AVT entry 0xnnnnnnnn @ 0xnnnnnnnn: I/O Address = 0xnnnnnnnn, Type = Interrupt	These are two separate cases of continuation messages. They are followed by information from the access validation and translation (AVT) entry associated with the problem. Usually this dump of information is accompanied by some other error message indicating the problem. Information from the AVT entry specified by one of these two lines is printed out to help diagnose the source of the problem.	Save this and any accompanying messages for analysis by product support personnel. See the user action for the message accompanying this message.

continued

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Table 5-12
ServerNet I Continuation and Informative Messages *continued*

Messages	Description	User Action
Dump of Exception Packet @ 0xnnnnnnnn	This continuation message is followed by additional information from the packet in question, which was not expected. Usually this packet dump is accompanied by some other error message indicating the problem—the exception packet is dumped to help diagnose what caused the problem. This message is usually seen in conjunction with timeouts on ServerNet I requests.	Save this and any accompanying messages for analysis by product support personnel. See the user action for the message accompanying this message.
SHIP Snet ID: 0xF0nnn	This informative message displays during initialization. The ServerNet I ID of this node is printed.	None

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Appendix A

Software Versions

Software versions provided by the Quick Install CDs for the SCO UnixWare 7 NonStop Clusters include:

- SCO UnixWare 7.1.1
- SCO UnixWare 7 NonStop Clusters 7 1.1+IP, PTF nsc1011c, PTF nsc1013a
- Compaq EFS 7.38a
- Compaq Management Agents 4.90
- System partition created from the Compaq SmartStart and Support Software CD 4.90

Additional software and versions needed include:

- Compaq SmartStart and Support Software CD 4.90 or later (to initialize the cluster)
- Compaq Management CD 4.90 or later (to install the Compaq Insight Manager client software)

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Appendix B

Quick Install Planning Worksheets

The following worksheets help you to gather and organize the information that you need for the SCO UnixWare 7 NonStop Clusters quick install procedures described in Chapter 3, "Installing Cluster Software," for the Compaq ProLiant ML370 server. Fill these worksheets out before you begin the software installation and use the data where needed in the procedures.

Table B-1
Quick Install Data

Screen	Field	Your Information
a	Read responses from previously saved diskette	
b	Date	
	Time	
	Time zone (only U.S. time zones are available)	
c	Cluster name	
d	System owner name	
	System owner login ID	
	System owner password	
	Root password	

continued

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Table B-1
Quick Install Data *continued*

Screen	Field	Your Information
e	Node 1 hostname for the cluster interconnect	node1-ic
Not used for ServerNet I cluster	Node 1 IP address for the cluster interconnect	10.1.0.1
	Node 2 hostname for the cluster interconnect	node2-ic
	Node 2 IP address for the cluster interconnect	10.1.0.2
	Netmask	255.255.255.0
f	Domain name	
	CVIP address	
	Netmask	
	Node 1 hostname for the public network	
	Node 1 IP address for the public network	
	Node 2 hostname for the public network	
	Node 2 IP address for the public network	
	Default route	
g	SNMP agent configuration	
	Contact name	
	Machine location	
	Community string	
	Manager IP address	
	Trap IP destination	
	Enable SNMP sets	
	Enable reboot	
h	Save responses	

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Table B-2
SCO UnixWare License Worksheet

Field	Your Information
Node 1 license number	
Node 1 license code	
Node 1 license data (if necessary)	
NonStop Cluster Two-Node License	
Node 2 license number	
Node 2 license code	
Node 2 license data (if necessary)	

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Glossary

CI Serial Cable

See Cluster Integrity Serial Cable

CLMS

See Cluster Membership Service

Cluster Integrity Serial Cable

The Cluster Integrity (CI) serial cable is a serial cable that connects to a serial port on each node in a two-node cluster. The cable prevents split-brain, a condition that results in both nodes in a two-node cluster trying to operate as the root node.

Cluster Membership Service

Cluster Membership Service (CLMS) determines which nodes are a part of the cluster and controls the operating system portion of nodes that join and leave the cluster.

Clusterized

The term refers to software that has been modified or designed to work in a cluster software environment.

Cluster Virtual IP

The Cluster Virtual IP (CVIP) address is the IP address of the cluster.

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CVIP

See Cluster Virtual IP

Desktop Management Interface

Desktop Management Interface (DMI) is an industry framework for managing and keeping track of hardware and software components in a system of personal computers from a central location.

DMI

See Desktop Management Interface

Ethernet Crossover Cable

The Ethernet crossover cable provides the node-to-node communication data path for the cluster.

FC-AL

See Fibre Channel Arbitrated Loop

Fibre Channel Arbitrated Loop

Fibre Channel Arbitrated Loop (FC-AL) is a communication method between hardware components.

HTTP

See Hypertext Transfer Protocol

Hypertext Transfer Protocol

Hypertext Transfer Protocol (HTTP) is the set of rules for exchanging files on the World Wide Web.

Interconnect

An interconnect is a physical connection between cluster nodes that transmits intracluster communication.

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PCI

See Peripheral Component Interconnect

Peripheral Component Interconnect

Peripheral Component Interconnect (PCI) is an interconnection bus system which provides high speed operation.

SAIL

See ServerNet Advanced Interface Logic

SAN

See Storage Area Network

ServerNet Advanced Interface Logic

ServerNet Advanced Interface Logic (SAIL) converts software requests into ServerNet operations.

ServerNet I

ServerNet I is a high-speed, low-latency cluster interconnect that uses a ServerNet I PCI adapter and two ServerNet I cables.

Simple Network Management Protocol

The simple network management protocol (SNMP) is a TCP/IP protocol that generally uses the User Datagram Protocol (UDP) to exchange messages between a management information base and a management client residing on a network. Because SNMP does not rely on the underlying communication protocols, it can be made available over other protocols, such as UDP/IP.

ServerNet PCI Adapter

A ServerNet PCI adapter (SPA) provides a redundant, high speed cluster interconnect.

SNMP

See simple network management protocol

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SPA

See A ServerNet PCI adapter

Split-Brain

Split-brain is a condition that results in both nodes in a two-node cluster trying to operate as the root node. The use of the CI serial cable, which is included in this cluster kit, eliminates the possibility of split-brain.

Storage Area Network

A storage area network (SAN) is a high-speed special-purpose network (or subnetwork) that interconnects different kinds of data storage devices with an associated data server on behalf of a larger network of users.

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